TRANSACTIONS

OF THE

OTOLOGICAL SOCIETY

VOL. VI

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TRANSACTIONS

OF THE

OTOLOGICAL SOCIETY

OF THE

UNITED KINGDOM

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE SIXTH SESSION, 1904–1905.

Edited by Jobson Horne, M.D.

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PAST PRESIDENTS

1899–1901. Sir William Dalby.

1901–1903. Urban Pritchard.

THE OTOLOGICAL SOCIETY
OF THE UNITED KINGDOM

OFFICERS AND COUNCIL

ELECTED DECEMBER 5, 1904

President

THOMAS BARR

Vice-Presidents	EDWARD CRESSWELL BABER ALPHONSO ELKIN CUMBERBATCH JOHN B. STORY
Hon. Treasurer	EDWARD LAW
Hon. Secretaries	HUGH EDWARD JONES PERCIVAL MACLEOD YEARSLEY
Hon. Editor of the "Transactions"	WALTER JOBSON HORNE
Hon. Librarian	HERBERT TILLEY
Other Members of Council	ARTHUR HENRY CHEATLE RICHARD LAKE URBAN PRITCHARD ARTHUR LOGAN TURNER ERNEST BLECHYNDEN WAGGETT ARTHUR LONGLEY WHITEHEAD

THE ABOVE FORM THE COUNCIL

PATHOLOGICAL COMMITTEE.

REFEREES

FREDERICK W. ANDREWES
SAMUEL G. SHATTOCK

ARTHUR HENRY CHEATLE
CHARLES HERBERT FAGGE
WALTER JOBSON HORNE
VITRUVIUS HAROLD WYATT WINGRAVE

LIST OF MEMBERS OF THE SOCIETY

Honorary Member.

Professor Adam Politzer, Vienna.

EXPLANATION OF ABBREVIATIONS.

P = President.	*L* = Honorary Librarian.
VP = Vice-President.	*C* = Councillor.
T = Honorary Treasurer.	*S* = Honorary Secretary.
Italics = Original Members.	*E* = Honorary Editor of the "Transactions."

The abbreviations placed after a Member's name indicate offices which have been held by him.

N.B.—Members are reminded that they are, themselves, responsible for the correctness of the descriptions in the following lists, and it is particularly requested that any change of title, appointment, or residence, may be communicated to the Senior Secretary before July 1 in each year.

Abercrombie, Peter Henderson, M.D.(Glasg.), 56 Harley St., W. Assistant Surgeon to the Central London Throat, Nose, and Ear Hospital. *Elected December* 2, 1901.

Adams, Frederick Vasey, F.F.P.S.(Glasg.), 10 Queen's Crescent, Glasgow. Assistant Surgeon to the Glasgow Ear Hospital. *Elected March* 3, 1902.

VP *Baber, Edward Cresswell,* M.B., 46 Brunswick Square, Brighton, and 62 Brook St., W. Surgeon to the Brighton, Hove, and Sussex Throat and Ear Hospital. *L.*

Ball, James Barry, M.D., 12 Upper Wimpole St., W., Physician to the Throat, Nose, and Ear Department, West London Hospital.

Ballance, Charles Alfred, M.B., M.S., F.R.C.S., 106 Harley St. Late Aural Surgeon to St. Thomas's Hospital. *S.C.VP.*

Ballance, Hamilton Ashley, M.D., M.S., F.R.C.S., 46 Prince of Wales Rd., Norwich.

P *Barr, Thomas,* M.D.(Glasg.), 13 Woodside Place, Charing Cross, Glasgow. Senior Surgeon to the Glasgow Hospital for Diseases of the Ear; Lecturer on Aural Surgery to the University of Glasgow. *VP.*

Bennett, Frederick William, M.D., 25 London Rd., Leicester. Surgeon to the Ear and Throat Department, Leicester Infirmary.

Benson, Arthur Henry, M.A., M.B.(Dub.), F.R.C.S.I., 42 Fitzwilliam Square, Dublin. Ophthalmic and Aural Surgeon to the City of Dublin Hospital.

Bond, James William, M.D., B.S., 26 Harley St., W. Physician to the Hospital for Diseases of the Throat, Golden Square.

Bowen, William Henry, M.S.(Lond.), F.R.C.S., 27 New Cavendish St., W. Assistant Surgeon, Royal Ear Hospital. *Elected February* 6, 1905.

Bronner, Adolph, M.D.(Heidelb.), 33 Manor Rd., Bradford, Yorks. Surgeon to the Bradford Eye and Ear Hospital. *C.*

Browne, John Walton, B.A., M.D., 10 College Square North, Belfast.

Bull, William Charles, B.A., M.B., F.R.C.S., 5 Clarges St., Mayfair, W. Aural Surgeon and Lecturer on Aural Surgery to St. George's Hospital.

Carson, Herbert William, F.R.C.S., 26 Welbeck St., W. Surgeon in charge Throat and Ear Department, Tottenham Hospital. *Elected December* 1, 1902.

Cathcart, George Clark, M.A., M.B., C.M.(Ed.), 35 Harley St., W. Assistant Surgeon to the London Throat Hospital. *Elected December* 3, 1900.

C *Cheatle, Arthur Henry,* F.R.C.S., 18 Savile Row, W. Assistant Aural Surgeon to King's College Hospital; Aural Surgeon, King Edward VII Hospital for Officers; Teacher of Aural Surgery to the Royal Army Medical College. *S.E.*

Cocke, Robert Sturgeon, M.R.C.S., L.R.C.P., 84 Harley St., W Assistant Surgeon, Royal Ear Hospital. *Elected February* 6, 1905.

Connal, James Galbraith, M.B., C.M., F.F.P.S.(Glasg.), 4 Burnbank Terrace, Glasgow. Lecturer on Aural Surgery to Anderson's College Medical School; Surgeon to the Throat and Nose Department, Central Dispensary, Glasgow; Assistant Surgeon to the Glasgow Ear Hospital. *Elected May* 2, 1903.

VP *Cumberbatch, Alphonso Elkin* M.B., F.R.C.S., 11 Park Crescent, Portland Place, W. Aural Surgeon, to St. Bartholomew's Hospital and National Hospital for the Paralysed and Epileptic, Queen's Square. *T.*

Dalby, Sir William Bartlett, B.A., M.B., F.R.C.S., 18 Savile Row, W. Consulting Aural Surgeon to St. George's Hospital. *P.C.*

Deanesly, Edward, M.D., F.R.C.S., 4 Waterloo Rd., Wolverhampton. Aural Surgeon to the General Hospital, Wolverhampton. *Elected March* 3, 1902.

Donelan, James, M.B., M.Ch.(R.U.I.), 6 Manchester Square, W. Physiologist, Laryngologist, and Aurist to the Italian Hospital. *Elected February* 2, 1903.

Fagge, Charles Herbert, M.B., M.S., F.R.C.S., 6 Cavendish Place, W. Aural Surgeon to Guy's Hospital. *Elected March* 5, 1900.

Farquharson, John Malcolm, M.B., C.M., F.R.C.P.(Ed.), 2 Coates Pl., Edinburgh. Surgeon to the Edinburgh Ear, Nose and Throat Infirmary; Lecturer on Diseases of the Ear, Nose and Throat, School of Medicine of the Royal Colleges, Edinburgh. *Elected December* 2, 1901.

Field, George P., 34 Wimpole St., W. Consulting Aural Surgeon to St. Mary's Hospital. *VP.*

Fullerton, Robert, M.D., M.C.(Ed.), 24 Newton Place, Glasgow. Honorary Consulting Surgeon for Diseases of the Throat, Nose and Ear, Greenock Infirmary; Surgeon to the Throat, Nose and Ear Department, Greenock Eye Infirmary. *Elected March* 4, 1901.

Grant, J. Dundas, M.A., M.D., F.R.C.S., 18 Cavendish Square, W. Surgeon to the Central London Throat and Ear Hospital, and Throat and Ear Department West End Hospital for Nervous Diseases. *C.*

Gray, Albert Alexander, M.D., F.F.P.S.(Glasg.), 14 Newton Terrace, Glasgow. Aural Surgeon to the Glasgow Central Dispensary. *Elected February* 3, 1901.

Guild, George Taylor, M.B., C.M.(Ed.), 164 Nethergate, Dundee. Surgeon to the Ear and Throat Department, Dundee Royal Infirmary; Lecturer on Diseases of the Ear and Throat to the University of St. Andrews.

Heath, Charles J., F.R.C.S., 3 Cavendish Place, W. Surgeon to the Hospital for Diseases of the Throat, Golden Square. *Elected March* 4, 1901.

Hill, George William, B.Sc., M.D., 28 Weymouth St., W. Aural Surgeon to St. Mary's Hospital.

E *Horne, Walter Jobson,* M.A., M.D., B.C.(Cantab.), M.R.C.P., 27 New Cavendish St., W. Surgeon to the Metropolitan Ear, Nose and Throat Hospital; in charge of Throat and Ear Department Farringdon General Dispensary. *S.*

Horsley, Sir Victor, F.R.S., 25 Cavendish Square, W. *C.*

Hovell, T. Mark, F.R.C.S.(Ed.), 105 Harley St., W. Consulting Aural Surgeon to the London Hospital. *C.*

Hunt, John Middlemass, M.B., C.M.(Glasg.), 55 Rodney St., Liverpool. Laryngologist to the Royal Infirmary, Liverpool.

Hutchison, Arthur Jaffray, M.B., C.M. (Glasg.), Assistant Surgeon, Brighton Throat and Ear Hospital, 84 Lansdowne Place, Brighton. *Elected March* 6, 1905.

Jackson, George, F.R.C.S.(Eng.), 19 Portland Villas, Plymouth. Senior Surgeon to the Devon and Cornwall Ear and Throat Hospital. *Elected February* 1, 1904.

Jakins, Percy, M.D.(Dur.), 120 Harley St., W. Surgeon to the Central London Throat and Ear Hospital.

Johnston, Robert McKenzie, M.D., F.R.C.S.(Ed.), 2 Drumsheugh Gardens, Edinburgh. Assistant Surgeon for Ear and Throat to the Royal Infirmary, Edinburgh.

Jones, Bertram Seymour, F.R.C.S., 51 Newhall St., Birmingham. Assistant Surgeon, Birmingham and Midland Ear, Nose, and Throat Hospital. *Elected June* 3, 1905.

S *Jones, Hugh Edward,* 19 Rodney St., Liverpool. Surgeon to the Eye and Ear Infirmary, Liverpool; Ophthalmic and Aural Surgeon to the Royal Albert Edward Infirmary, Wigan. *C.*

Jones, Henry Macnaughton-, M.D., R.U.I., M.Ch., M.A.O. (Hon. Caus.), F.R.C.S.(I. and Ed.), 131 Harley St., W. Late Surgeon to the Eye, Ear and Throat Hospital, Cork.

Kelly, Adam Brown, B.Sc., M.B., C.M.(Glasg.), 26 Blythswood Square, Glasgow. Surgeon for Diseases of the Throat, Nose and Ear to the Victoria Infirmary and Bellahouston Dispensary.

Kelson, William Henry, M.D., F.R.C.S., 17 Cavendish Place, W. Assistant Surgeon to the London Throat Hospital. *Elected March* 3, 1902.

Kerr, James, M.A., M.D., D.P.H.(Cantab.), School Board Offices, Victoria Embankment. Late Surgeon to the Bradford Eye and Ear Hospital. *Elected February* 2, 1903.

C *Lake, Richard,* F.R.C.S., 60 Harley St., W. Surgeon to the Royal Ear Hospital.

T *Law, Edward,* M.D., C.M.(Ed.), 8 Wimpole St., W. Surgeon to the London Throat Hospital. *C. V.P.*

Lawrence, Laurie Asher, F.R.C.S., 9 Upper Wimpole St., W. Surgeon in charge of Throat and Ear Department, Western General Dispensary.

Lee, Charles George, M.R.C.S., L.R.C.P., 11 Princes Avenue, Liverpool. Honorary Surgeon to the Liverpool Eye and Ear Hospital, Aural Surgeon to the Royal Southern Hospital. *Elected May* 2, 1903.

Leech, Joseph William, M.D., M.S., F.R.C.S.(Ed.), 12, Eldon Square, Newcastle-on-Tyne. Senior Surgeon, Newcastle Throat and Ear Hospital. *Elected February* 6, 1905.

Little, Andrew, M.B., C.M.(Aberd.), 114 Manningham Lane, Bradford. Surgeon to the Eye and Ear Hospital, Bradford. *Elected December* 1, 1902.

Love, James Kerr, M.D.(Glasg.), Olrig, Newark Drive, Pollokshields, Glasgow. Aural Surgeon to the Royal Infirmary, Glasgow, Honorary Aurist to the Glasgow Institute for Deaf and Dumb, Lecturer on Aural Surgery, St. Mungo's College, Glasgow. *Elected February* 3, 1902.

McBride, Peter, M.D., F.R.S.(Ed.), 16 Chester St., Edinburgh. Aural Surgeon and Laryngologist to the Royal Infirmary, Edinburgh, Lecturer on Diseases of the Ear, Nose, and Throat at the University of Edinburgh. *C. V.P.*

McCall, Anthony, M.D.(Glasg)., Boscombe Court, Bournemouth. Surgeon to the Throat, Nose, and Ear Department Royal Boscombe and West Hants Hospital. *Elected December* 1, 1902.

Manning, Leslie Samuel, M.B., C.M.(Aberd.), Christchurch, New Zealand. Aural Surgeon to Christchurch Hospital. *Elected December* 2, 1901.

Marriage, Herbert James, M.B., B.S., F.R.C.S., 109 Harley St., W. Aural Surgeon to St. Thomas's Hospital. *Elected February* 6, 1905.

Masina, H. M., F.R.C.S., Grant Medical College, Bombay, India. *Elected February* 3, 1902.

Matheson, Farquhar, M.B., C.M.(Aberd.), 11 Soho Square, W. Surgeon to the Royal Ear Hospital.

Milligan, William, M.D., C.M.(Aberd.), 12 St. John St., Deansgate, Manchester. Lecturer on Diseases of Ear at Owens College, Manchester, Honorary Surgeon to the Manchester Ear Hospital, Aural Surgeon to the Manchester Royal Infirmary. *S.C.*

Mole, Harold Frederick, F.R.C.S., 19 Mortimer Road, Clifton. Surgeon in charge of the Aural Department Bristol Royal Infirmary. *Elected February* 2, 1903.

Murison, Alexander Logan, M.R.C.S., L.R.C.P., 54a Welbeck St., W. Assistant Surgeon, Royal Ear Hospital. *Elected February* 6, 1905.

Murray, George, M.R.C.S., L.R.C.P., 2 Harley St., W. *Elected December* 1, 1902.

Nelson, Joseph, M.D., L.R.C.S.(R.U.I.), 20 Wellington Place, Belfast. Aural Surgeon to the Royal Victoria Hospital, Belfast. *Elected March* 7, 1904.

Nicoll, James Henderson, M.B., F.F.P.S.(Glasgow), 4 Woodside Place, Glasgow, Consulting Surgeon to the Glasgow Ear Hospital. *Elected March* 7, 1904.

Nourse, William John Chichele, F.R.C.S.(Ed.), Abchurch House, Sherborne Lane, E.C. Assistant Surgeon to the Central London Throat and Ear Hospital. *Elected December* 2, 1901.

Paget, Stephen, F.R.C.S., 70 Harley St., W. Aural Surgeon to the Middlesex Hospital. *C.*

Parker, Charles Arthur, F.R.C.S.(Ed.), 141 Harley St., W. Surgeon to the Throat Hospital, Golden Sq. *Elected February* 3, 1902.

Paterson, Donald Rose, M.D.(Ed.), M.R.C.P.(Lond.), 18 Windsor Place, Cardiff. *Elected March* 5, 1900.

Pegler, Louis Hemington, M.D.(Ed.), 58 Harley St., W. Surgeon to the Metropolitan Ear, Nose, and Throat Hospital.

Permewan, William, M.D., F.R.C.S., 7 Rodney St., Liverpool. Surgeon to the Throat and Ear Department, Southport Infirmary. *Elected December* 3, 1900.

Peters, Edwin Arthur, M.D., B.C.(Cantab.), 52 Wimpole St., W. Surgeon to the Throat and Ear Department, Bolingbroke Hospital. *Elected December* 1, 1902.

Pinder, Thomas Henry, M.R.C.S., Alexandra Road, Manchester. Surgeon to the Manchester Ear Hospital. *Elected February* 2, 1903.

Pollard, Bilton, M.B., B.S., F.R.C.S., 24 Harley St., W. Late Surgeon in charge of Aural Department University College Hospital.

POTTER, EDWARD FURNISS, M.D.(Brux.), M.R.C.P.(Lond.), M.R.C.S., 49 Queen Anne St., W. Surgeon to the London Throat Hospital. *Elected December* 3, 1900.

C *Pritchard, Urban,* M.D.(Ed.), F.R.C.S., 26 Wimpole St., W. Aural Surgeon to the King's College Hospital. Professor of Aural Surgery, King's College, Consulting Surgeon to the Royal Ear Hospital. *V.P. P.*

Purves, William Laidlaw, M.D.(Ed.), 20 Stratford Place, W. Aural Surgeon to Guy's Hospital.

Sandford, Arthur W., M.D.(R.U.I.), 13 St. Patrick's Pl., Cork. Lecturer in Ophthalmology and Otology at Queen's College, Cork, Surgeon to the Cork Ophthalmic and Aural Hospital. *C. V.P.*

SCOTT, SYDNEY RICHARD, M.S., F.R.C.S., 44 Welbeck St., W. Aural Surgeon, Evelina Hospital. *Elected February* 6, 1905.

Sheild, Arthur Marmaduke, M.B., B.C.(Camb.), F.R.C.S., 4 Cavendish Place, W. Surgeon to the Throat Department St. George's Hospital, late Aural Surgeon to the Charing Cross Hospital.

SPICER, FREDERICK. M.D.(Dur.), 17 Wimpole St., W. Surgeon to the Metropolitan Ear, Nose, and Throat Hospital. *Elected March* 3, 1902.

Spicer, Scanes, M.D., B.Sc.(Lond.), 28 Welbeck St., W. Surgeon to the Throat Department and Lecturer on Diseases of Throat at the St. Mary's Hospital.

Stewart, William Robert Henry, F.R.C.S.(Ed.), 42 Devonshire St., W. Surgeon to the Throat and Ear Department Great Northern Central Hospital, Consulting Surgeon to the London Throat Hospital.

V.P *Story, John B.,* M.B., B.Ch.(Dub.), F.R.C.S.I., 6 Merrion Square North, Dublin, Ireland. Honorary Oculist and Aurist to the Claremont Institute for Deaf and Dumb. *C.*

SYME, WILLIAM SMITH, M.D.(Ed.), 3 Northbank Terrace, Glasgow. Assistant Surgeon to the Glasgow Ear Hospital. *Elected February* 1, 1904.

Teale, Michael Aubrey, M.R.C.S., L.R.C.P., 38 Cookridge St., Leeds. Aural Surgeon, Leeds Public Dispensary. *Elected February* 6, 1905.

Thomson, St.Clair, M.D., M.R.C.P., F.R.C.S., 28 Queen Anne St., W. Physician to the Throat Hospital, Golden Square, Assistant Physician for Diseases of the Throat to the King's College Hospital.

Thorne, Atwood, M.B.(Lond.), M.R.C.S., 10, Nottingham Pl., W. Assistant Surgeon to the London Throat Hospital. *Elected December* 2, 1901.

L *Tilley, Herbert,* M.D., F.R.C.S., 89 Harley St., W. Surgeon to the Throat Hospital, Golden Square. *S.*

Tod, Hunter Finlay, M.A., M.B., B.C.(Cantab.), F.R.C.S., 101 Harley St., W. Assistant Aural Surgeon to the London Hospital, Surgeon Throat and Ear Department Paddington Green Children's Hospital. *Elected December* 1, 1902.

C *Turner, Arthur Logan,* M.D., F.R.C.S.(Ed.), 27 Walker St., Edinburgh. Surgeon for diseases of the Throat and Ear Deaconess Hospital, Edinburgh, Assistant Surgeon to the Ear and Throat Department Royal Infirmary, Edinburgh.

C *Waggett, Ernest Blechynden,* M.A., M.B., B.C.(Cantab.), 45 Upper Brook St., W. Surgeon to the London Throat Hospital, Surgeon to the Throat and Ear Department Great Northern Central Hospital.

Walker, Henry Secker, F.R.C.S., 45 Park Sq., Leeds. Assistant Ophthalmologist and Aural Surgeon to the General Infirmary, Leeds, Lecturer on Ophthalmology and Otology at the Yorkshire College, Leeds. *C.*

Waterhouse, Herbert Furnival, M.D.(Ed.), F.R.C.S., 81 Wimpole St., W. Surgeon in charge of Aural Department Charing Cross Hospital. *Elected February* 3, 1902.

West, Charles Ernest, F.R.C.S., 132 Harley St., W. Chief Assistant, Ear Department, St. Bartholomew's Hospital. *Elected February* 6, 1905.

Westmacott, Frederick Hibbert, F.R.C.S., 8 St. John St., Manchester. Honorary Aural Surgeon to the Manchester Children's Hospital, Pendlebury. *Elected March* 4, 1901.

C Whitehead, Arthur Longley, M.B., B.S.(Lond.), 3 Park Square, Leeds. Honorary Ophthalmic and Aural Surgeon to the General Infirmary, Leeds. *Elected December* 3, 1903.

Williams, Patrick Watson, M.D., 1 Victoria Sq., Clifton, Bristol. Physician to the Throat Department Bristol Royal Infirmary, Honorary Physician to the Deaf and Dumb Institute.

WILLIAMS, RICHARD, M.R.C.S.(Eng.), L.R.C.P.(Edin.), L.F.P.S. (Glasg.), 82, Rodney St., Liverpool. Senior Surgeon, Liverpool Eye and Ear Infirmary. *Elected February* 6, 1905.

WINGRAVE, VITRUVIUS HAROLD WYATT, M.D.(Dur.), 11 Devonshire St., W. Physician to the Central London Throat and Ear Hospital. *Elected December* 2, 1901.

WOOD, CYRIL GEORGE RUSS, F.R.C.S., Hardwicke House, Shrewsbury. Surgeon to the Eye, Ear, and Throat Hospital, Shrewsbury. *Elected February* 2, 1903.

Woods, Robert Henry, B.A., M.D.(T.C.D.), 39 Merrion Sq. East, Dublin. Surgeon to the Throat, Nose, and Ear Department, Richmond, etc., Hospitals, Dublin.

S *Yearsley, Percival Macleod*, F.R.C.S., 10 Upper Wimpole St., W. Surgeon to the Royal Ear Hospital. *C.*

RULES AND REGULATIONS.

I.—*Name of the Society.*

The Society shall be called "The Otological Society of the United Kingdom."

II.—*Objects of the Society.*

The objects of the Society shall be:

(*a*) The exhibition and demonstration of patients, models, drawings, and specimens (microscopical or otherwise), illustrating the Anatomy, Physiology, Pathology, and Therapeutics of the Ear.

(*b*) The reading of papers and the discussion of questions in Otology, previously approved by the Council.

(*c*) The investigation by Committees:

(i) Of matters of public importance relating to Otology.

(ii) Of new methods of investigation or treatment of the diseases of the ear.

III.—*Constitution of the Society.*

The Society shall consist of Ordinary and Honorary Members.

The Officers of the Society shall be elected from among the Ordinary Members, and shall consist of a President, not less than two, and not more than four, Vice-Presidents, a Treasurer, a Librarian, an Editor of the 'Transactions,' and two Secretaries, who, with six other Members, shall constitute the Council. At least one fourth of the Council shall consist of Members not resident in London.

IV.—*Election of Members.*

Candidates shall be proposed on a form provided for the purpose, and signed by at least three Members from personal knowledge, who shall state the grounds of their recommendation, which shall be, either

(*a*) Contributions to Otology.

(*b*) The charge of an Aural Clinic approved by the Council.

(*c*) Professional eminence.

The names of those proposed as new Members shall, in the first instance, be submitted to the Council, with whom the power shall rest of declining to allow the nomination to proceed.

The proposal paper shall be read at one ordinary meeting, and the ballot shall be taken at the next meeting.

No election shall take place unless ten Members vote ; one black ball in five shall exclude.

V.—*Form of Admission by the Chairman.*

Members shall be admitted personally by the following form, after signing their names in the admission book, and thereby agreeing to abide by the rules of the Society, and paying their admission fee and first annual subscription.

Form of Admission.—" By the Authority and in the name of the Otological Society of the United Kingdom, I admit you a Member thereof."

VI.—*Honorary Members.*

The Council shall have the power of electing men of distinguished eminence in Otology as Honorary Members. The number of Honorary Members shall not exceed six.

VII.—*Expulsion of Members.*

The Council shall have the power of expelling from the Society any Member whose conduct or mode of practice is considered unworthy of the Society. Notice of the Council's intention to expel him shall be sent in writing to the address in the Society's books, and he may appeal to the Society, whose vote, under Rule 8, shall be final.

VIII.—*Appeal.*

A Member who appeals against the decision of the Council, under Rule 7, can be finally expelled only at a General Meeting especially called for that purpose, and of which a written notice shall have been sent to every Member at least fourteen days previously. At least twenty votes must be accorded, and four fifths shall carry the expulsion.

IX.—*Subscriptions.*

There shall be an Admission Fee of One Guinea.

The Annual Subscription shall be One Guinea, payable to the Treasurer in advance at the date of the Annual General Meeting. Any Member whose subscription is six months in arrear shall be reminded of the same by the Treasurer, and if it be not paid within the current year he shall again be reminded by the Treasurer, and if he fails to pay his subscription, his name may be removed by the Council from the list of Members.

X.—*The Election of Officers and Council.*

(*a*) All the Ordinary Members shall be summoned by letter to the Annual Meeting in December, notice being given a fortnight beforehand, and the hour of meeting being stated.

(*b*) The President, Vice-Presidents, Treasurer, Librarian, Editor, Secretaries, and Council shall be elected by ballot at each Annual Meeting, and shall commence their duties on the day following election.

(*c*) One third of the Ordinary Members of the Council shall be replaced in rotation at each Annual Meeting by an equal number of Ordinary Members chosen from the Society at large.

No more than two members on the staff of the same hospital in London shall sit on the Council at the same time.

Only one member of the Council resident out of London shall represent the same city at the same time.

No member of the Society, with the exception of the President, the Treasurer, and the Editor of 'Transactions,' shall serve for more than three consecutive years upon the Council.

(*d*) Balloting lists of the members recommended by the Council to fill the vacant offices shall be prepared by the Secretaries, and forwarded, together with the summons to the Annual Meeting, to every Ordinary Member of the Society.

(*e*) Two Scrutineers, appointed by the President at the commencement of the Annual Meeting, shall receive the balloting lists during the first hour, at the end of which they shall report the result to the meeting.

(*f*) In the event of equality of suffrage the President shall determine by lot.

(*g*) If a Member wishes to propose for ballot any candidate

for office other than those whose names stand upon the list recommended by the Council, the name of such candidate, duly proposed by one Member and seconded by two other Members, shall be sent to the Senior Secretary at least a week before the Annual General Meeting.

(*h*) The Council shall have the power of filling up any vacancies which may occur in any of the offices of the Society between one Annual Meeting and another.

XI.—*The President and Vice-Presidents.*

The President shall regulate all the proceedings of the Society and Council, state and put questions, interpret the application of the rules and regulations, and decide every doubtful point. He shall sign the minutes of General and Council Meetings.

In the absence of the President, one of the Vice-Presidents, Treasurer, or some Member chosen by the meeting, shall perform his duties. The President and Vice-Presidents shall not serve for more than two consecutive years.

Every third President shall, if practicable, be resident out of London.

XII.—*The Secretaries.*

There shall be a Senior and a Junior Secretary elected for each session. The Senior shall retire at the end of each session, and shall, if the Society approve, be succeeded by the Junior. The Secretaries shall have the management of the correspondence of the Society and Council. They shall attend meetings. They shall take minutes, which they shall read at the following meeting. They shall notify to new members their election. They shall have charge of, and keep a register of, all papers communicated.

One of the Secretaries shall, if practicable, be resident out of London.

XIII.—*The Treasurer.*

The Treasurer shall receive all moneys due to the Society, and make up all payments ordered by the Council, keeping an account of all such receipts and payments. He shall keep a printed receipt-book for subscriptions, and every receipt and cheque shall be signed by him. He shall submit to the Council a written Report

of the financial state of the Society, for presentation to the Annual General Meeting. All moneys shall be banked in the name of the Society. The Treasurer shall not hold office for more than five consecutive years.

XIV.—*The Librarian.*

The Librarian shall not hold office for more than five consecutive years.

XV.—*The Editor of the 'Transactions.'*

The Editor of the 'Transactions' shall not hold office for more than five consecutive years.

XVI.—*The Council.*

The Council shall have the management of the affairs of the Society. They shall meet as required during the session of the Society. Notice of the hour of meeting shall be transmitted by the Secretaries to each Member. Four shall form a quorum, and six shall form a quorum when the question of the expulsion of a Member has to be considered. The President, or any three Members, may call a special meeting.

They shall determine questions by vote, or by ballot if demanded, the Chairman having the casting vote. They shall call a special meeting or meetings after the close of the session to determine what communications and illustrations shall be published in the 'Transactions'; they shall make such regulations and issue such orders as shall appear to them conducive to the good government of the Society and to the proper management of its affairs, subject to the Rules of the Society. They shall appoint Investigating Committees as may be required.

XVII.—*The Society's Transactions.*

The Transactions of the Society, under the designation 'Transactions of the Otological Society of the United Kingdom,' shall be published in such manner as the Council may direct. The 'Transactions' shall be presented to all Members of the Society who have paid their annual subscription. No Member whose entrance fee or subscription is in arrear shall be presented with the

'Transactions.' The Council shall be empowered to present, in the name of the Society, copies of the 'Transactions' to such scientific bodies as they may think fit.

XVIII.—*Investigating Committees.*

The Council shall, as occasion demands, appoint Committees of Members of the Society, and, if desirable, one or more non-Members, for the purpose of investigating questions of importance in Otological science, and shall have authority to grant such sums of money as they may deem necessary for the expense of these investigations. The Reports of such Committees shall be presented to the Council to be dealt with as they may deem most advisable. Such Committees shall be called "Investigating Committees": they shall consist of not less than three Members. The Investigating Committees shall continue to act until they have reported on the subject referred to them, or been dissolved by the Council. Every Member who has acted on an Investigating Committee shall sign the final Report, or shall state in writing his reason for declining to do so.

The Report shall be first received and considered by the Council, which may be specially summoned for that purpose, and shall afterwards, with their sanction, be presented at an Ordinary Meeting of the Society.

The Council shall be informed by their Secretary of the retirement of any Member of an Investigating Committee, in which case the Council may at their discretion appoint another Member of the Society to fill the vacancy.

The Investigating Committees shall render to the Council an account of all money received by them for the purpose of their investigations.

The Council shall have the power to dissolve an Investigating Committee whenever they may deem it expedient.

XIX.—*Ordinary Meetings.*

(*a*) The Ordinary Meetings of the Society shall be held on the first Monday, or some other day selected by the Council, at 4.30 p.m., in December, February, March, and May, in London or elsewhere, as the Council may decide.

(*b*) Each Member of the Society shall have the privilege of

introducing a visitor at every Ordinary Meeting, on entering his visitor's name in the attendance-book; but no visitor shall be introduced more than twice in the same session.

(*c*) The business of the Society at the Ordinary Meetings shall be:

(i) The reading of papers and report of cases.

(ii) The demonstration of cases.

(iii) The exhibition and examination of specimens (microscopical or otherwise), drawings, instruments, models, methods of treatment, and the discussion of Otological subjects.

(*d*) At the Ordinary Meetings of the Society nothing relating to its laws or management shall be brought forward.

(*e*) At Ordinary Meetings ten Members shall form a quorum.

(*f*) Additional Ordinary Meetings shall be held if the Council think them necessary.

(*g*) Papers (which must be written in form fit for printing) shall not, as a rule, be of such length as to occupy more than fifteen minutes in delivery. An abstract of each communication, for publication in the Medical Journals, shall be given to the Secretaries before the end of the Meeting at which the communication is read.

(*h*) Members wishing to read papers previously approved by the Council, or show cases, specimens, etc., shall, if possible, give notice thereof to the Secretaries ten days before the meeting.

(*i*) All papers shall be handed to the Secretaries immediately after being read.

(*j*) In any discussion, each Member taking part shall write on a form provided for the purpose an abstract of his remarks, which shall be given to the Secretaries before the end of the meeting.

XX.—*The Annual General and Special Meetings.*

The Annual General Meeting of the Society, for the election of the officers and other Members of the Council, shall be held in December. All proposals to enact, alter, or repeal rules shall be proposed by the Council only at the Annual or Special Meeting of the Society, notice of all such proposals being transmitted to every Member, together with the summons to the Annual or Special Meeting. For the adoption of rules or changes so proposed, the votes of two thirds of the Members present must be in favour of the proposal.

Any Member of the Society may suggest to the Council alterations in the rules, by letter addressed to the Secretaries.

A Special General Meeting may be called at any time by the Council, or at the written request of any ten Members giving at least fourteen days' notice by letter to every Member of the Society resident in the United Kingdom, of the time of meeting and the business upon which it is summoned, and no business shall be entered upon at such meeting except that which has been notified.

XXI.—*Library Regulations.*

(*a*) The Library shall be open at the same hours as that of the Medical Society—viz., from 1 p.m. to 6 p.m. daily, except on Saturdays, when it will be closed at 3 p.m.

(*b*) Members may obtain books at 11, Chandos Street between those hours on signing a book provided for that purpose. But any books or periodicals may be placed by the Council on a separate list, such books not being allowed to be removed from the Library.

(*c*) A book must be returned at the expiration of a fortnight if wanted by any other Member. The Librarian will in such a case write to the Member in whose name the book was taken out.

(*d*) If the book be not returned within four days of such notice, a fine of 6d. will be charged for each day that the book is retained beyond such days of grace.

(*e*) Members resident in the country can obtain books by writing to the resident Librarian and transmitting the cost of postage. Such books are sent at the borrower's risk.

(*f*) A Member taking out a book will be held responsible for its being returned in good condition.

ANNUAL REPORT OF COUNCIL.

1903–1904.

PRESENTED AT THE ANNUAL MEETING, DECEMBER 5, 1904.

In presenting its Annual Report, the Council has pleasure in referring to the continued prosperity of the Society, and to the excellence of the work done during the past session. To those members who have contributed to the success the Council tenders its most hearty thanks.

In addition to the Annual Meeting, four Ordinary Meetings have been held. The extra-Metropolitan Meeting was held in Glasgow last May, and the thanks of the Council are due to the Faculty of the Glasgow Physicians and Surgeons, who kindly placed their hall at the disposal of the Society, and also to the Glasgow University for the use of a lecture-room, where a much appreciated demonstration was given by Dr. Walter Colquhoun in the absence, through illness, of Professor McKendrick. The Council also desires to mark its appreciation of the efforts of Dr. Galbraith Connal, to whom, as local Secretary, no small share of the great success of the Glasgow meeting was due.

One of the chief features of the session was a paper read by Dr. William Milligan upon "The Etiology and Treatment of Labyrinthine Suppuration," a contribution which seemed to focus the attention of the Society upon this important branch of aural surgery.

The Society now numbers ninety-seven members. During the session 1903–4 four new members have been elected, one has resigned, while the Council has to regret the loss through death of Dr. J. M. E. Scatliff of Brighton, and Dr. W. A. McKeown of Belfast.

In conclusion, the Council has pleasure in reminding members that the Ordinary Meeting in May, 1905, will be devoted to a discussion upon "Auditory Vertigo," a subject which will be introduced by Sir Victor Horsley and Dr. Risien Russell.

Financial Statement of the Honorary Treasurer.

The Honorary Treasurer, in presenting the balance sheet, duly audited, for the Session 1903–4, stated that the Society numbered ninety-seven members. The receipts for the year, inclusive of a balance of £71 1*s.* 10*d.* brought forward from last year, amounted to £180 5*s.* 10*d.* The expenditure to date was £93 10*s.*, leaving a balance in hand of £86 15*s.* 10*d.* There was still owing to the Society £1 1*s.*, the subscription of a member. The bank balance showed a little more than sufficient to cover the outstanding liabilities of the Society for the past year, which consisted of the cost of printing the *Transactions*, the rent of rooms, and the honorarium of the late Mr. Hall.

Report of the Honorary Editor of the "Transactions."

The Council during the past Session has made some alterations in the manner of publishing and circulating the proceedings of the Society.

By an arrangement entered into with the *Journal of Laryngology, Rhinology, and Otology* the scientific proceedings are reported *in extenso* after each meeting, and a copy of the report in fasciculus form is supplied to each member prior to the next meeting, thereby enabling members to follow more closely the work of the Society.

At the close of the Session the *Transactions* of the Society will be published in volume form and supplied to the members as hitherto.

The volume comprising the proceedings of the last Session has been published to-day. It will be noted that the size of the volume has been increased from that of a demy to that of a royal octavo.

The index has been enlarged to increase its usefulness for purposes of research, and the total amount of printed matter slightly exceeds that of previous volumes.

These alterations and additions have been made without materially exceeding the amount expended upon the *Transactions* in previous years, and it is hoped that they will be satisfactory to the members.

Honorary Librarian's Report.

The Honorary Librarian reported that a fair number of members consulted the library during the past year. This he partly attri-

buted to the fact that five of the most important of the exchanges had been suitably bound and were more readily available in that form. They were: *The Archives of Otology, The Transactions of the American Ototogical Society, Internationales Centralblatt für Ohrenheilkunde,* and *Annales des Maladies de l'Oreille.* Five numbers of *The British Journal of Children's Diseases* had been presented by the publishers. In order to render the library as complete as possible the members were earnestly requested to present copies of their otological works as soon as they were published. A card catalogue of the contents of the library was kept up to date, and was available for the use of members.

Report of the Pathological Committee.

Report by the Referees upon a Specimen of Tumour removed from the External Auditory Meatus by Mr. Hunter Tod. *Particulars of the case will be found in the Society's "Transactions," vol. v, p.* 22.

As the author's sections did not include the base of the growth, we prepared a second series, from which the following account is in part drawn up.

The free surface is of a somewhat simple papillary type. The substance of the papillæ is abundantly infiltrated with cells, most so at the surface, and more sparsely at the base. The cells are of large size, polymorphous, and have conspicuous oval nuclei.

When they are scanty there intervenes a finely fibrillated basis substance traversed by capillaries.

The number of lymphocytes present is small, except in the tissue of the corium, at the lateral margin of the growth, and in the marginal papillæ themselves, which project but slightly above the general level. There is no pigmentation of any of the large polymorphous cells which chiefly make up the tumour. No invasion of the fibrous substance of the corium is in progress.

That the cells in question are not plasma cells (Unna) is clear from their size and the size of their nuclei. We have submitted frozen sections to the Unna-Pappenheim plasma-cell stain, with negative result. The cells, which are of the endothelial kind seen, *e. g.*, in a tubercular lesion, have no definite arrangement, and nowhere have the groups a lumen.

The freedom of the corium from invasion, the irregular distribution of the cells, and their individual isolation in many places by

fibrillar connective tissue, in which there lie branching connective or fibroblastic elements, are points, we think, which do not allow of the growth being classed as a sarcoma. The capillaries ramifying through the tissue, moreover, want the characters seen in sarcoma, in that they have no very intimate relation with the cells around, and often present a sheath of fibrillar connective tissue intervening between the endothelial wall and the surrounding cell-groups.

For these various reasons we should regard the excrescence, therefore, as a granuloma in which the connective or endothelial proliferation has been followed by little tendency to firoblastic change, a phenomenon of which we know other examples.

F. W. Andrewes.
S. G. Shattock.

Report by the Referees upon a Specimen of Tumour removed from the External Auditory Meatus by Mr. E. B. Waggett. *Particulars of the case will be found in the Society's "Transactions," vol. vi, p.* 44.

We have examined the sections submitted to us, and confirm the author's description of the histology of the growth.

Some of the polymorphous cells are, as the author notes, scattered in the fibrillar matrix of connective tissue, but in other places cells of the same type are disposed without intervening material, in distinctly circumscribed channels. The ill-defined lumen in some of the columns we are inclined to think due to the loss of cells in the preparation of the section.

Taking the extent and distinctness of the disposition referred to into consideration, we think that the author is justified in naming the new growth an endothelioma.

F. W. Andrewes.
S. G. Shattock.

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EIGHTEENTH ORDINARY MEETING.

Monday, December 5th, 1904.

THE PRESIDENT, Dr. THOMAS BARR, IN THE CHAIR.

The following communications were made:

NOTES OF A CASE OF FATAL LEPTO-MENINGITIS FOLLOWING UPON ACUTE SUPPURATIVE OTITIS MEDIA OF INFLUENZAL ORIGIN.

BY A. E. CUMBERBATCH.

Mary M——, aged thirty, was seen at hospital on October 30, 1904, with purulent catarrh of the left tympanum. Duration of the disease was about a fortnight after influenza.

On examination the membrane was found denuded of epithelium; much congested and slightly bulging in the postero-superior segment. There was profuse muco-purulent discharge. Temperature was 100·8° F., pulse, 96. Pain was complained of over the mastoid and backward along the line of the lateral sinus. Pressure over this region increased the pain. There was no headache, nor giddiness, nor had there been any sickness, but patient looked very ill. The mastoid was opened shortly after seeing the patient. Some pus and granulation tissue were found, and the whole of the cancellous tissue of the mastoid was removed. The tympanum was not disturbed.

November 2.—Patient expressed herself as feeling quite comfortable. There was no headache nor sickness; all post-mastoid pain had gone, but the temperature, which had fallen immediately after the operation, began to rise about 11 p.m. the night after the operation, and, when seen at 2 o'clock, was 106° F. It was thought that there might be a subdural abscess, and the lateral sinus was freely exposed, but no pus was found. The tegmen tympani was next explored, but with negative results. The patient was ordered to be sponged with hot water and spirits of wine.

November 3.—Temperature 104° F., pulse 120. The tongue was slightly furred, but moist. No headache, no pain anywhere. Discs normal. Blood examination gave 15,000 leucocytes.

November 4.—Patient was much the same, but drowsy. 20 c.c. of antistreptococcus serum were injected twice in twenty-four hours.

November 5.—Patient was unconscious, and had slight deviation of the eyes downwards and to the left, and transient twitchings of both sides of face. The injections of serum were continued, but she remained unconscious, and died early on the morning of the 7th.

Post mortem.—All the organs were found to be healthy except the brain. In that organ lepto-meningitis of the entire left side was found. Venous sinuses and the jugular vein were free from any clot.

The point of interest in this case was the entire absence of symptoms except high temperature.

Cultivation of the blood after death showed abundant streptococci.

The following points were submitted for discussion :

1. Ought the lateral sinus always to be exposed in cases of acute suppurative mastoiditis, on the chance that there may be a subdural abscess ?

2. Ought the jugular vein to have been tied and the lateral sinus laid open and plugged in this case as the temperature remained high after the operation ?

3. Ought the antistreptococcus serum to have been injected more frequently, say every four hours ?

Dr. Urban Pritchard asked whether there was any history of previous suppuration in that ear. In every similar case he had come across the patient had died.

Mr. Arthur Cheatle said that unless the symptoms warranted it, the lateral sinus should not be opened in such a condition. Both the middle and the posterior fossæ should be opened and searched for the seat of trouble. Mr. Cumberbatch said some of the wound was stitched and there was a drain at the bottom. In such acute cases he (Mr. Cheatle) thought it wiser to leave the wound widely open. He regretted the temporal bone was absent, as from that some information might have been gained as to the path of infection. It might have been that the poison had been conveyed by the perivascular lymphatic spaces to the meninges of the middle fossa, for there was a direct path from the middle ear to the middle fossa, by means of the petro-squamosal sinus and its entering veins.

Dr. William Milligan thought it was obvious from the data given by Mr. Cumberbatch that nothing further could have been done, because such cases of acute and rapidly developing meningitis

following influenza seemed to be inoperable. The only point which might be raised in such circumstances was whether, with such a persistently high temperature, it was worth while to try to drain the pia arachnoid space. He was not aware whether such a proceeding had been followed by success, but he thought one might remember the possibility of trying it. He had one case similar to the present in which he had tried drainage, but it had no effect; the meningitis was fulminating, and the child died.

Mr. Charles Ballance said the temperature chart of this case reminded him of one which he saw six days ago. The patient had been to a concert on Saturday night, and on Sunday night had severe headache, and was, when seen on Tuesday evening, comatose and evidently moribund. There was no paralysis observed before he became comatose, and he had no symptoms except high fever, and he had been sick once. There was chronic ear disease on the right side. The temperature had varied between 105° and 103·4° F. The temperature chart was much like that in the present case. He agreed with Mr. Cheatle that it would have been interesting to have seen the temporal bone in Mr. Cumberbatch's case, because in a case of fulminating meningitis which he saw a few years ago the examination of the temporal bone was most instructive. The condition followed influenza, and there had been a slight discharge from the ear for two or three days. The patient had never had ear disease before. He found a little pus in the antrum; and from the roof of the tympanum, which was not dehiscent, extended a small vein filled with clot to the dura. He was sure that in that case the infection had arisen in the attic and extended to the meninges. In some cases a meningitis without infection of the tympanum occurred in influenza. Cases had been related by Bristow of meningitis and also brain abscess without local cause of infection, so one must distinguish a case in which there was ear disease from those which occasionally arose as the result of influenza and in which there was no local disease of bone around the brain from which infection could be traced. He did not think it possible, when the pus was underneath the visceral arachnoid, to attempt any drainage. How could the sub-arachnoid space be drained? The arachnoid spread from convolution to convolution, and every space between each convolution would have to be opened. He had operated upon cases in which there had been a layer of pus in the arachnoid cavity itself, outside the visceral arachnoid, but he thought they must be rare cases. One case he operated upon was that of a woman who had hemiplegia after influenza, and he

thought it was a case of abscess of the brain. It was one in which pus spread over the visceral arachnoid, of the left frontal and parietal lobe, and formed a definite thick layer. He made openings in the skull and tried to wash it away, but it was imperfectly done and very difficult, probably because of intra-cranial pressure. At the *post-mortem* examination it was found to be easily wiped off the visceral arachnoid. He thought such cases as that under discussion should be operated upon, but for those cases in which the pus was underneath the visceral arachnoid no operation was possible.

Dr. Dundas Grant remarked that the question of drainage was answered to a certain extent by Dr. Lermoyez, in a communication which Dr. Grant had heard him make at Bordeaux. Dr. Lermoyez recommended that in cases of otogenetic meningitis a very large trephine opening should be made, so as to diminish the pressure and relieve the tension, and that copious lumbar punctures should be made, and repeated on several occasions; and he described three cases in which he believed there had been recovery from meningitis, shown to be purulent by the result of lumbar puncture. Dr. Grant asked whether that suggestion met with the support of members of the society. He had not yet had an opportunity of trying it. He thought opening the lateral sulcus in Mr. Cumberbatch's case was strongly indicated, more especially in the light of a case upon which he (Dr. Grant) operated a few days ago, which, however, had the essential difference that it was a case of chronic, and not acute, suppuration of the middle ear, and that there was a temperature of over 105° F. before he did the radical mastoid operation. In the antrum he found no pus whatever, but abundant granulation tissue. He then opened the sulcus, and at once pus exuded from it, coming, not only from the sulcus, but from the sinus itself. The sinus had evidently been the seat of thrombosis, and the clot was breaking down, but the sudden burst of high temperature was a very good reason for opening the sulcus, whether anything further were done or not.

Mr. Hugh E. Jones mentioned two cases very similar to the present one, which he had operated on some years ago. In both, he removed a fairly large amount of bone from the squamo-parietal region, and found purulent lymph, which was situated, as in the first class of case described by Mr. Ballance, beneath the pia mater. In following up the semi-solid layer of pus, he despaired of reaching its borders, and gave up the attempt. In both cases the patient died about ten days after the onset of the illness, and

in both the cause of the otitis was influenza. He felt bound at the time to try to do something to relieve the meningeal symptoms. but his efforts were of no avail.

Dr. Arthur Peters asked whether a pathological examination of the pus had been made to determine what was the micro-organism present.

The President said they must all admire Mr. Cumberbatch's promptitude in operating on this case, namely within two or three hours of the patient having come under observation. The absence of rigors and the absence of marked intermissions of temperature seemed to exclude lateral sinus mischief, while the persistently high temperature pointed to lepto-meningitis, as the case proved to be.

Mr. Cumberbatch, in reply, said he thought Mr. Cheatle missed the point of his question, because he saw no indication for exploring the lateral sulcus. He (Mr. Cumberbatch) thought in an ordinary operation for acute mastoid suppuration when the temperature remained high, by exploring the cranial cavity one often found a subdural abscess.

Mr. Cheatle said Mr. Cumberbatch misunderstood his remarks. He recommended examination of the whole region to find out the cause.

Mr. Cumberbatch, continuing, said he did so, including the tegmen tympani. He thought it was a case of septicæmia, and that the meningitis was only an expression of it. That was why he raised the question whether, after having operated as he had done in the present case, the temperature not falling, and with the possibility of one of the smaller sinuses being blocked the patient should be given a chance by tying the jugular vein and opening the lateral sinus. If it was meningitis that procedure would do no good; but *was* it only meningitis, or was the meningitis only an expression of the septicæmia? Streptococci were found in the blood after death, and in the discharge on the meninges.

Case of Severe Tinnitus with (almost complete) Loss of Hearing in a Man aged twenty-one.

By E. Furniss Potter.

The patient's history was that in April, 1900, he had suffered from an attack of febrile disease, which lasted from ten to fourteen days. The nature of this he did not know. He was not isolated. He had discharge of "blood and mucus" from the nose and throat,

and was delirious for three or four days, during which period he became deaf.

During convalescence, about six weeks after, he began to be troubled with noises—varied in character—in the head and ears, low at first, but which had gradually increased, and at the present time were so distressing that they interfered seriously with the patient's sleep, and rendered him incapable of concentrating his attention on any kind of work. The effect was so depressing that the patient feared mental breakdown. He had occasionally felt giddy. He stated that as a child he had at times suffered from noises in the head and temporary deafness after blows on the ears. There was no history of acquired nor signs of hereditary syphilis. The hearing was practically *nil.* The voice could just be perceived on the left side through a speaking tube, or on shouting close to the ear, but words could not be distinguished. The tuning-fork could be heard faintly when placed on the left mastoid. Hearing by the right ear was absolutely *nil.*

Dr. Potter had been induced to bring the case before the Society by reading the accounts of and the discussions following the cases described by Mr. Parry and Mr. Lake at the meeting of the Society in May last. The question had occurred to him, would it be desirable to suggest, with any reasonable hope of benefit in this case, an operation such as division of auditory nerves or removal of the cochleæ? Mr. Lake in his case, as the symptom for which relief was chiefly sought was giddiness, had directed his attention to the semi-circular canal. In this instance, the trouble being severe tinnitus, would it therefore be a justifiable procedure to remove the cochleæ? The patient was most anxious to have "something done," and was willing to submit to operation if there were any reasonable probability of benefit thereby. The case was brought forward in order to obtain an expression of the trend of opinion regarding operative interference in these pitiable cases.

Dr. Urban Pritchard asked Mr. Ballance and Mr. Lake whether after operation in their cases of tinnitus the noise remained although the giddiness was stopped.

Mr. Ballance said the case referred to was comparable to one which he showed at the first session of the Society. He removed the semicircular canals for suppuration. Before the operation the patient was very giddy and could not cross the room, and she had a great and distressing noise in the ear. She was also practically

deaf. After the operation and the healing of the wound by grafting, he exhibited her at a meeting of the Society. She had no tinnitus, no giddiness, and there was a return of hearing. That would seem to point to the fact that tinnitus had something to do with the semicircular canals. But, since then, Mr. Lake's and other cases seemed to point to a contrary opinion; they seemed to show that, in cases of tinnitus due to peripheral irritation, the part of the petrous bone involved was the cochlea. Dr. Potter's case offered several alternatives. First, it might be left alone altogether. Sometimes tinnitus was worse on one side and sometimes on the other; and sometimes it was not in the ear at all, but only in the middle of the head. In dealing with the cochlea the facial nerve might be injured. He thought the simplest way if one decided to do a radical operation in that case, and it was believed to be peripheral—which he doubted—would be to divide both the facial nerves and unite them with the hypoglossals to begin with, and then there would be a free field to remove the petrous bone on both sides. The other alternative was to divide the auditory nerve on both sides; it would be no use to divide it only on one side. He did not think anything had been learnt so far from the cases of division of the auditory nerve which had been published. In operating for the relief of tinnitus, one should be reasonably sure that the disease was peripheral in origin. Possibly the general opinion in Dr. Potter's case was that it should be left alone.

Dr. Macnaughton Jones said it was surely within the experience of members that cases of extreme tinnitus, associated with giddiness and the other symptoms present in Dr. Potter's case, got well without radical operation. He recalled many cases of intra-tympanic trouble, due to pressure from within and granulations, which had been cured by middle-ear treatment alone, and by such simple steps as curetting. Before proceeding to such an operation as that mentioned, one should adopt ordinary otological measures with regard to the middle ear to see if the patient would not get well. He had exhibited an extreme case before the Society. The attacks of giddiness were associated with insensibility. There were correlative ocular symptoms. When he first saw him he had to be supported. He was now well both of the tinnitus and the giddiness; the hearing was very good. In that case, before he had him under his care, a serious cranial operation had been proposed.

Mr. Richard Lake said he had only done the one operation for vertigo to which reference had been made, and all that he had

to state in addition was that shortly afterwards he had opened a cochlea with temporary relief. It was as difficult a little operation as one would wish to indulge in, though not dangerous. He had some instruments now by which one could cut through the promontory without risk of having a side-slip; one was on the principle of the carpenter's brace, which had a very fine point and five sides; and he had had some burrs made on the principle of the recessing tool for sinking the head of a screw. In that way he thought a sufficiently large hole could be obtained. Could one differentiate for certain between central and peripheral tinnitus the question would be simplified; but he would never knowingly operate for tinnitus with a central cause.

The President said that it would obviously be impossible to undertake the full discussion of the operative treatment of tinnitus aurium, but the feeling of the meeting seemed to be against the employment of operative treatment in this case.

Dr. William Milligan said that in the three cases of the kind on which he had operated the noise in the head had not disappeared, although it had been improved. He gathered from the notes that the case was originally toxic, affecting the auditory nuclei, and if that were so it dispensed altogether with the idea of operation. Judging also from the notes and from what he had heard, he would be averse to any operation. It probably was a nuclear lesion.

Dr. Dundas Grant asked whether it was not possibly a case of meningitis in which the inflammation had extended from the internal auditory meatus to the cochlea and left its marks there, although it had subsided in the general cavity of the skull.

Dr. Law said he saw the patient under discussion, more than two years ago, and at that time he was so deaf that he could not hear a tuning-fork of any description, by aerial or by bone conduction, therefore he thought it was more likely to be a central case than a peripheral one. In a case of bilateral affection of the labyrinth the patient would probably hear some tone by either bone or aerial conduction.

Dr. Furniss Potter thanked the members for giving the results of their experience. He confessed that he had had no experience in labyrinthine surgery, and he did not feel sanguine about the result of operation in the present case. If operation were performed he thought the probability of benefit was doubtful, and there was a likelihood that the facial nerve would be damaged. He agreed with Mr. Lake as to the difficulty of deciding whether a tinnitus was due to a central or a peripheral cause. He was

Fig. 1 —Showing nerve to cochlea, posterior canals, and superior and horizontal canals. The accessory ampulla of the horizontal canal is seen outside the beginning of the posterior canal. The aqueduct of the vestibule is seen broken off short. (Human labyrinth.) × 4.

Fig. 2.—Showing the sac of the endolymph to the left. The black masses seen in the ampullæ of the superior and horizontal canals and at the vertex of the posterior canals are calcareous deposits. (Human labyrinth.) × 3·5.

pleased to hear of the hopeful results mentioned by Dr. Macnaughton Jones, and would like to know how to accomplish them. His own experience of the treatment of tinnitus had been most disappointing.

A Demonstration of Specimens Prepared by the Author's Method to Show the Membranous Labyrinth in Man and Lower Animals.

By Albert A. Gray.

The slides which I am about to show you have all been made from specimens which I have prepared during the last seven or eight years. The macroscopic specimens were made by the method devised by myself and described in the *Journal of Anatomy and Physiology*, vol. xxxvii, p. 379. The microscopic specimens I made by the ordinary methods of microscopy. The photographs have been prepared for the most part by Dr. Leslie Buchanan, of Glasgow.

The first slide shows the human membranous labyrinth, magnified about four times. It is of course, impossible to get the whole object into focus for photographic purposes and I therefore focussed with the intention of bringing into prominence an "accessory ampulla" as I have termed it. I have already referred to this structure at the meeting of the British Medical Association at Oxford, and I need therefore say no more about it at present beyond pointing out that there is no nerve to it. It occurs in four out of six specimens which I possess, though not always so distinctly present as in this preparation a photograph of which you now see.

The second preparation is also of the human labyrinth and shows a condition which, so far as I know, has not yet been described. By comparing this preparation with the previous one, it will be noticed that in this one there are some black irregular masses in the ampullæ of the superior and horizontal canals which were not present in the previous slide. These are white, crystalline deposits. They appear black in the photograph because they were taken by transmitted light. Now, whether these deposits are to be looked upon as particularly large supernumerary otoliths or as pathological calcareous or uratic deposits I would not care to hazard an opinion. Otoliths are not uncommonly found in the ampullæ of the canals, but these are much larger than any otoliths which have ever been found in the human subject. On the other hand, there were no known clinical symptoms which could lead one to infer that the canals were affected pathologically.

The next preparation is also of the human labyrinth, but it is not magnified. It is shown for comparison with that of the seal which follows.

The labyrinth of the seal is obviously the larger in every respect—cochlea, vestibule and canals. In this matter the seal stands in peculiar contradistinction to the cetacea, the whales, porpoises, etc. I have no specimen showing the labyrinth of any of these animals, but from corrosion preparations it has been ascertained that while the cochlea is very large the vestibule and semicircular canals are smaller than in almost any mammal. In this slide there is also to be seen one of the otoliths which are very large in the seal. The next slide, however, shows them better. You will observe that there are two otoliths, both far larger than any to be found in man. I cannot give any figures for comparison with other mammals, since they have not been described before, but in shape one of them is very like the otolith as it is found in some fishes.

The remaining slides are photo-micrographs. The first is that of the white mouse. It shows the extremely delicate rods of Corti and the relatively short hair-cells. The next slide shows the same structure in the mole and the difference in appearance is at once obvious. In the latter the large massive rod of Corti is shown and the long large hair-cell. This is not merely a matter of the relative sizes of the animals, for in the rat of which I have also a specimen, though not with me, the organ is very like that of the mouse. In this specimen I wish to point out more particularly the spiral arrangement round the hair-cells. This spiral structure is generally assumed to be the termination of the nerve-fibre. Katz of Berlin, however, maintains that the nerve-fibre ends in the form of a cup in which the base of the hair-cell lies. I must confess that I was sceptical as to the existence of such a spiral until I found it in this specimen. The mole is the only animal in which I have been able to find it, and even now I am by no means convinced that it is the termination of a nerve-fibre. It certainly looks rather thick for such a structure. It should also be pointed out that this spiral structure does not stop short one third or one half way up the hair-cell as stated in works on anatomy.

The last slide shows the organ of Corti of the guinea-pig. It is of interest chiefly as revealing the remarkable structure above the cells of Hensen, stained in this specimen with osmic acid. So far as I know it is peculiar to the guinea-pig and is assumed to be fatty in chemical constitution.

FIG. 3.—Human labyrinth, natural size. Showing the auditory nerve with the dura mater of the internal meatus faintly outlined. The accessory ampulla is also seen in this specimen.

FIG. 4.—Labyrinth of the seal, natural size. Showing one of the otoliths.

for a few days in order to remove any water from the deeper parts.

After removal from the alcohol, a fine thread is then tied either round one of the canals or round the auditory nerve. A suitable length of the thread is left, and at its free end is fixed with a piece of gummed paper to the glass stopper of the jar in which the specimen is to be stored. The jar itself is then completely filled with xylol, and the paraffin block attached to the stopper is lowered gently into the full jar, the stopper being firmly locked, and only a very small air-bubble being left at the top to allow for expansion by heat. It is important that the jar be as full as described in order to prevent splashing, which will certainly destroy the specimen. In the course of a few days the paraffin will have dissolved out of the preparation, and the membranous structures will appear. The specimen must never be removed from the jar, or it will fall to pieces by its own weight.

When once a specimen has been obtained, it should be photographed as soon as possible in case of it being destroyed either by splashing or disintegration.

It should be added that the process of decalcification is much shortened, and the subsequent extraction of the block rendered more easy, if the cancellous portion of the bone is removed by a short stout knife before the specimen is put into alcohol.

Finally, the experimenter must not be disappointed if he has many failures and breakages; such are inevitable, even with the utmost care. In this, as in all other matters, experience is of fundamental importance.

The President thanked Dr. Gray, in the name of the Society, for his interesting demonstration, and remarked that the study of the comparative anatomy of the labyrinth was of very great value, and might lead to more light on the functions of the various parts of the human labyrinth. It was to be hoped that Dr. Gray would continue his investigations.

Dr. Urban Pritchard joined in the congratulation to Dr. Gray for his paper. He agreed that the spiral structure in one of the slides could not be nerve.

Dr. Jobson Horne added his gratitude to Dr. Gray for his beautiful specimens, and desired to learn from Dr. Gray his method of preparing them. If time did not permit of the explanation that evening perhaps he would communicate it to the "Transactions." Those who wished to conduct similar investigations would be glad of that assistance.

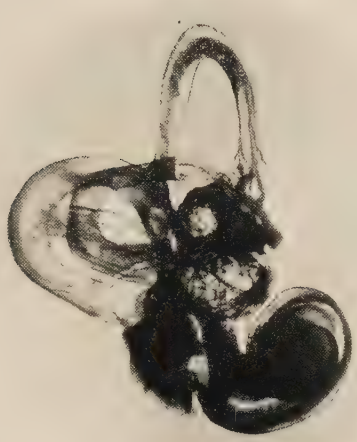

Fig. 5.—Labyrinth of the seal, × 2. Showing the pentagonal shape of the horizontal canal, and the well developed ligamentum spirale.

Fig. 6.—Organ of Corti of white mouse, × 150. Showing the delicate rods of Corti and the short outer hair-cells. The ganglion spirale is seen to the left.

Mr. Macleod Yearsley asked whether Dr. Gray had discovered accessory ampullæ in any other canal than the horizontal, and whether he had any explanation to offer. He did not know whether Dr. Gray was acquainted with the work of Professor Yves Delage, in which he pointed out that the horizontal canals were the only ones situated in a cardinal plane of the body, and whether the accessory ampullæ could be explained on that ground.

Dr. Gray, in reply, said he did not think the accessory ampulla of the horizontal canal could be associated with any definite physiological function; it had no nerve and there could be no possibility of currents affecting any nerve termination in it. It might possibly have some effect in directing currents into the narrow canal further up. It would be too much a matter of speculation to enter into the physical conditions which bear upon the passage of water through a funnel which, according to Lord Kelvin, is one of the most difficult mathematical investigations one could make. In preparing the specimens he had a great many failures at first, and it took him several years before he was successful. One must be very careful how one handled them; having got them into the final solution, they must never be taken out, or they would break up.

Oto-Masseur Driven by a Turbine (Ash).

By Richard Lake.

The oto-masseur, excepting its motive power, was similar to that shown at the International Otological Congress in 1904. The motive power of this instrument was water, and one of these instruments had been in use for three months at the Royal Ear Hospital and given great satisfaction; its speed had not yet been determined.

The President said it was a pity that such instruments could not be made to work noiselessly, because their loud sound complicated matters, for one did not know what effects might be due to the sound vibrations, and what might be due to the vibrations of the air produced by the piston.

Notes of Case of Internal Ear Deafness of Sudden Onset.

By Arthur Cheatle.

The patient, a middle-aged woman, had noticed loud noises in the ears after yawning seven or eight times. The "noises" lasted

from twenty to thirty minutes, when she found she was deaf in the left ear, and it had a "dead feeling." There was no giddiness. The deafness had remained, and occasional "noises" were heard. Examination of the ear revealed nothing beyond marked nerve deafness.

Dr. Wm. Milligan asked whether Mr. Cheatle considered the case to be one of organic deafness or of traumatic hysteria; also, whether any observation had been made of the field of vision.

Dr. Dundas Grant asked whether the deafness was greatest for the highest pitched tones, or was there any difference in regard to the pitch of the tones? The object of his question was, that when the highest pitched tones were still retained, as in the present case, it pointed to a central rather than to a labyrinthine lesion, and the prognosis was, on the whole, more favourable, because in many such cases it was a functional rather than an organic condition which caused the deafness.

Dr. Jobson Horne asked whether, in Mr. Cheatle's experience, the affection of the peripheral nerves referred to was peculiar to internal ear deafness, or whether they were not also met with in middle-ear deafness or cases on the border-line.

Dr. Albert Gray asked whether the patient was very much exhausted at the time she was yawning at the onset of the symptoms.

Mr. Arthur Cheatle, in reply, said he could not answer Dr. Milligan's question at all. He would be glad of suggestions as to what the case was. He had also seen another case like it recently, but it had puzzled him absolutely. Of course there were numbness of the auricle in middle-ear affection, but why it should be met with in association with internal ear affections puzzled him. He supposed it had some relation to Head's areas. The patient heard Galton's whistle all through. One ear recovered but the other did not; she had some hearing left for the voice and heard the watch on contact. There was no diminution in the field of vision; her eyes were examined. He had thought of the possibility of her being exhausted by teaching, but she had been many years at the work and did not appear to be run down in health. Dr. Milligan had raised an important question with regard to toxæmia, and one should consider the toxæmic conditions of the auditory apparatus. He had thought of functional trouble, but there was no neurasthenia or anything of the kind, and she had passed her menopause.

FIG. 7.—Organ of Corti of the mole. Showing the massive heads of the rods of Corti and the spiral structure round the hair-cells, running right up to the top of the latter. × 350.

FIG. 8.—Organ of Corti of the guinea-pig. Showing the peculiar structure above the cells of Hensen, stained black with osmic acid. × 300.

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A Case of Acute Cerebral Abscess.

By A. L. Whitehead.

Although chronic cerebral abscess, latent for an indefinite period, but ultimately giving rise to acute symptoms, is not uncommon, acute abscess secondary to ear disease is rare.

The case now recorded occurred in a lad aged fourteen years. Apart from some deafness, associated with a chronic purulent discharge from both ears for twelve months, the boy had enjoyed perfectly good health up to January 26th, 1904. At three in the afternoon of that day he left school complaining of severe headache; the pain grew rapidly more intense and the boy became very irritable, crying out constantly of pain in the head, chiefly in the frontal region, and never referred to one or the other side.

During the next twenty-four hours he vomited twice and became drowsy, but resented interference and was at times delirious. When seen by his medical attendant, Dr. Bird, on the evening of the 27th he could not be roused, looked very ill, and had a temperature of 103° F.

He was sent to the hospital the same night and admitted under my care. His temperature was then 101·8° F.; pulse 120; respirations 32. He was in a state of partial stupor, resented interference, and could not be roused to answer questions, but during the examination constantly complained of pain in the head and repeatedly placed his left hand to the left side of the head. The knee-jerks could not be elicited, but there was free movement of all the limbs and no obvious paralysis of any muscles.

The pupils were equal and reacted to light; there was a tendency to divergent strabismus.

Both auditory meatuses were full of pus, the tympanic membranes destroyed, and the tympanic cavities full of granulation tissue. There were no external signs over the mastoids but apparently some tenderness to pressure on both sides.

Chloroform was administered half an hour after his admission, and the left mastoid explored; very extensive bone disease, with much pus, granulation tissue, and *débris* were found; the dura mater was exposed by the disease and was found covered with granulations; it was opened and the overlying temporo-sphenoidal lobe explored; no abscess was found.

A similar operation was performed on the right side, with the same negative result. The boy was much collapsed after the operation, and only kept alive by oxygen and strychnine.

On the following day, January 28th, he was very restless, his arms and legs moving constantly, and there was some retraction of the neck. Pulse 120, very feeble; temperature 97° F. The loss of consciousness was complete. On the two following days his condition remained the same. Cerebro-spinal fluid drawn off through a lumbar puncture was examined and reported to be perfectly normal.

On January 31st while dressing the wound I noticed that the exposed dura mater on the left side looked quite healthy, but on the right side was of a dirty grey colour and bulged outwards. A pair of dressing forceps pushed about an inch through the cerebral cortex at once evacuated a considerable quantity of blood-stained semi-purulent fluid, together with fragments of necrosed brain substance.

On the following day he was quite rational and talked with his friends. Convalescence was uneventful but slow, being retarded by an attack of pleurisy, without effusion. The abscess was drained for three weeks. At first a large quantity of pus came away daily; at the end of a month the discharge had ceased, and the mastoid cavity was grafted on both sides with a good result, ordinary conversation being now heard without any difficulty.

Undoubtedly, in this case, an acute suppurative cerebritis was present at the time of the exploratory operations, but no collection of pus having formed, the exploring tube simply passed through the softened brain substance. The subsequent operation evacuated the pus and the necrosed brain matter.

The diagnosis was rendered more difficult by the presence of bone disease in both mastoid processes, and there were no guiding signs or symptoms to indicate the affected side. Otorrhœa, vomiting, intense headache, and drowsiness passing into coma, were the only definite grounds on which a diagnosis of cerebral abscess could be based. The more common symptoms, including constipation, optic neuritis, slow pulse, subnormal temperature, and hemiplegia, were entirely absent.

In many cases of cerebral abscess even after the most careful study of all the symptoms, it is often most difficult to arrive at a correct diagnosis, and in some cases absolutely impossible with any approach to certainty. In numerous instances a problematical diagnosis between two or even more morbid conditions is the utmost which can be attained. Exploratory operation should be urged in all cases where symptoms are urgent even if signs are somewhat indefinite.

To recommend an operation for the relief of cerebral abscess only in those cases in which the diagnosis is certain is to sacrifice many lives which might ultimately be saved.

A Short Paper (Founded upon an Experience of 400 Operations) on the Restoration of Hearing after Removal of the Drum and Ossicles by a Modification of the Radical Mastoid Operation for Suppurative Ear Disease.

By Charles Heath.

It is not without some diffidence that I am bringing to your notice the operative methods I adopt with a view of restoring hearing and arresting discharge in chronic suppurative ear disease, but having frequently been asked by members of this Society to bring the matter forward, I hope you will forgive me should I fail to be of interest. I am told my methods differ so greatly from those of other surgeons that you may not be unwilling to examine them, and I trust I may provide something worthy of discussion.

You may remember that I showed a large number of cases with restored and excellent hearing at the meeting of the Society just a year ago. Since then I have performed the operation just 100 times, and with increasing confidence that the system I adopt, or some slight modification of it, will ultimately be adopted as a means of restoring hearing to large numbers of persons afflicted with suppurative ear disease. At that meeting a year ago there was a prolonged discussion on the cases I showed, but I had no opportunity then of explaining my method of operation.

It would be superfluous in this Society to give the reasons which induce the surgeon to decide on operation, so I will at once proceed to enumerate the advantages of my method of operation, to explain the details of it, and to show the instruments I have designed for performing it. The advantages are:

1st.—Little shock to the patient, as the operation can be performed in half an hour.

2nd.—There is no disfiguring scar.

3rd.—There is no shaving of the head.

4th.—The after-treatment is easy for both patient and surgeon.

5th.—The surgeon familiar with this operation can usually tell, with the aid of the instruments I employ, not only the direction in which the antrum lies, but the depth of the cavity, and can often define its dimensions before removing any bone.

Last, and most important of all.—A considerable amount of hearing is restored and preserved in a vast majority of the patients.

Over the preliminaries I will be brief. The day before the operation the head and hair should be washed and dried, the ear syringed with some warm antiseptic lotion, but not plugged, whereupon the ear and neighbouring skin are packed in a wet boric compress and covered with waterproof. This dressing is removed on the operating-table, when the few short hairs that grow near the top of the front of the ear are cut away with scissors. The square rubber sheet-cap I hand round has an aperture near each of the four sides, and through the one most suitable in size for the patient the ear is passed; the sheet is then wrapped round the head and opposite ear, so as to cover the forehead and hair, leaving only the affected ear and adjoining skin visible through the aperture; this done, the sheet is fastened on the top of the forehead with the curved forceps I show you, and remains firmly fixed till the end of the operation. In this way all the hair is kept away from the wound during the operation, and the head and hair are prevented from getting soiled with blood or lotion, thus saving much time and trouble in cleaning and drying after the operation, and obviating the necessity of shaving a large part of the head, which is a great consideration, especially in the case of women.

I begin the incision at the top of the ear, just above the upper attachment of the pinna and in the angle where the cartilage joins the scalp, and continue it round to the back of the ear in the angle all the way until it reaches the level of the bottom of the bony meatus. The incision must be made while the ear is in the natural position, for if the latter be turned forward at the time of the incision the skin will be drawn off the head and the wound will ultimately prove to have been made too far back. Its length does not exceed an inch and a quarter to an inch and a half, according to the size of the ear. The first incision is limited to the depth of the skin; the ear is then pulled forwards, thus widening the incision, which is now deepened until the temporal fascia and pericranium are reached; the tissues superficial to these are now carried forward with the concha until the cartilaginous meatus is seen. This must be thoroughly defined, and the whole of the superior quadrant exposed by separating the upper part of the concha from the temporal fascia; the posterior quadrant must next be cleared of post-auricular muscles, and,

lastly, the posterior half of the inferior quadrant of the cartilaginous meatus must be bared; thereupon a crescentic incision commencing on the suprameatal ridge of the zygoma is carried round the exposed cartilaginous meatus and should reach the bone; the tissues within this crescentic incision are now separated from the bone far enough to expose the margin of the bony meatus and post-meatal spine; then the meatus separator, which I show you can be usefully employed, and the cartilaginous meatus within the same limits, must be carefully separated and, in continuity with it, the skin extending all the way to the drum membrane can also be raised and saved, and at the completion of the operation will be found valuable for covering up a large area of bone, and in providing a thin and shelving edge of epithelium to grow over adjoining bone, as soon as granulations have formed; moreover, it reaches much farther within the cavity and therefore covers up more bone than is possible when only the cartilaginous meatus is preserved. By this plan no more bone is bared than will need to be removed during the operation, and the temporal fascia is unopened. The cartilaginous and cuticular lining of the anterior part of the bony meatus is neither moved nor damaged, so it is not likely to become swollen and thus interfere with proper inspection of the tympanum during the healing of the wound. Having controlled the hæmorrhage, a narrow retractor, such as I hold in my hand, is placed in the bony meatus and the tube of cartilage and skin is pressed against the front wall of the passage and is thus out of the surgeon's way. The operator can now explore the tympanum, and through it the aditus and antrum. I show you here a number of double-ended probes, one or other of which can be depended upon to pass into the antrum; often it will go well into the cavity, and the point can be turned outwards towards the skin, so that one can say, "This will be an easy antrum to open; it is large, and the bone covering it is thin"; and when this is the case you will see how confidently one can use the mallet and gouge. I frequently open the cavity in removing the first piece of bone, and in more difficult cases, where the antrum is small and deep, the bone sclerosed, and there is no indication from its structure that one is approaching the antrum, it is a satisfaction to know, with the aid of such probes, that one is working in the right direction and that the cavity is almost reached. Having defined the situation of the antrum as far as the probe has entered it—and the position of the point of the probe is known by the indicator on the handle which

I show you—should the probe have gone into the usual site of the antrum, it is proof that the lateral sinus is not misplaced and anxiety on that point is removed, and I have been able by the aid of these instruments to foretell the dangerous position of the lateral sinus before exposing it. It is well to act as though the antrum extended somewhat lower than the probe, for it often does so, and moreover the bone below has to be removed at some stage of the operation, so there is no objection to doing it early. (Here let me point out that if the cavity be large the post-meatal spine does not indicate the spot where the antrum comes nearest to the surface.) A portion of the posterior wall just below the spine should be removed, and this in my opinion is best and most quickly done with mallet and gouge. If the antrum is not at once seen, the opening in the bone can be deepened at the same time as it is widened vertically, without extending further backwards; the probe will always tell the direction of the antrum should it prove to be deep. In at least 60 per cent. of the cases I have operated upon I have found the antrum entirely in the pars petrosa, quite beyond the region of the mastoid process. Having found the cavity and made an opening large enough for a bent probe to enter, it should be explored and certain points cleared up, such as whether there is exposure of dura mater or lateral sinus, one of which conditions will be found in quite half the cases that come under operation. The opening can now be enlarged, and the cavity followed and all irregularities smoothed out; and for this purpose these very long burrs on the table are most useful, inasmuch as they are not only long enough for both hands to be used, the right to drive and the left to steer, but they allow the hands to be kept far enough away from the wound for the surgeon to be able to see how the work is progressing; by their means also the bone can be removed very rapidly if necessary, and the bent ones can be worked in different positions, as round a corner. I rarely enlarge the antrum more than just enough to remove all mucous membrane and open out all recesses, for nature usually provides an inflammatory barrier round the cavity blocking up the adjoining cells, and it is unwise to destroy this defence. For the purpose of removing the bridge over the *iter* I use the mallet and gouge, cracking cautiously, and not actually cutting, through the upper and lower supports, and lifting the loosened bridge out with a strong bent probe. This method does not jeopardise the facial nerve. It will now be easy to remove the malleus and incus, for which purpose I have found these spoon

forceps of great assistance, and have never known an ossicle to slip once the forceps has taken hold. The instrument is also useful for tearing away the remains of the drum and any large granulations that may be present.

The most difficult part of the operation is the treatment of the tympanum itself. I am accustomed to remove the mucous membrane of the attic after thoroughly exposing it by removal of all overhanging bone. The mucous membrane of the lower part of the tympanum, including the oval window, I prefer to leave if the Eustachian tube is in good working order. The projecting part of the stapes I remove with these fine nippers. If the Eustachian tube is obstructed I leave but the mucous membrane surrounding and joining the round and oval windows; the whole mucous membrane of the tympanum I destroy only when there is nerve deafness and no prospect of restoring hearing. Having completed the operation on the deeper parts, it is necessary to smooth and enlarge the new meatal canal so as to make it the same size in its whole length, and the anterior part of the original bony meatus remains as the anterior part of a much enlarged meatus.

It is now necessary to shape the meatal flap. A pair of long dissecting forceps being inserted into the cartilaginous meatus and opened widely will render the passage tense; a scalpel can now be entered from above and made to cut its way into the lumen of the meatus just internal to the concha; a pair of fine probe-pointed scissors are then used with one blade in this opening, and the meatus is divided along the top from without inwards towards the tympanum, but rather nearer the anterior than the posterior wall; an incision at right angles to the commencement of this incision is now made backwards and downwards as far as the middle of the floor of the cartilaginous meatus, passing close to the concha all the way; thus a large flap is formed consisting of rather more than the posterior half of the meatus; this flap now falls downwards and backwards, covering the floor and part of the posterior wall of the newly enlarged meatus. The outer end of the cartilaginous flap reaches to the pericranium, which was left right up to the margin of the bony meatus in order that the flap might be stitched to it; catgut is used for this stitch, as it is buried when the ear is replaced. The knife is now passed through the orifice of the cartilaginous meatus, and an incision carried upwards and slightly backwards until the opening is large enough to allow the surgeon's little finger to enter. The bleeding having been arrested, the whole cavity is dried, and should be swabbed with some powerful antiseptic; a drainage-

tube, as large as will go in, is inserted, and it should be long enough to extend from the antrum to a short distance external to the tragus. The ear is now replaced and stitched in its natural position, the wound usually healing by immediate union, on account of the fact that soft tissues only are involved, no bone being uncovered; moreover, the employment of the large tube has the effect of taking tension off the stitches.

A well-squeezed and large wet dressing covered with waterproof soaks up discharge better than a dry one, and can be removed with less discomfort to the patient, as it does not adhere. The bandage should not be passed under the chin, but should be kept entirely round the cranium, so that it may not be soiled by vomit, and pressure, if such be necessary, can there be tolerated.

After-treatment.—The next day I remove the dressings, mop out the cavity as far as possible through the tube, swab with some antiseptic, remove one or two stitches, and put on a dressing similar to the first, but somewhat smaller, as the discharge will be less. The bandage can now be taken under the jaw.

The second day I remove the dressing and the tube, examine and mop out the cavity thoroughly through a large speculum (such as this which I have designed to stay in without holding), remove any organised clot or lymph, dry, and then swab with idoform emulsion and replace the tube. The discharge will now be very slight and the patient after the mopping can generally hear a faint whisper. By this time the post-aural wound is usually healed and the remaining stitches are removed. The patient is generally allowed up with a small wet dressing, daily applied, until granulations have formed. At night a firm dressing and bandage are applied to protect the ear. You may have observed that no mention has been made of syringing the ear; it is not in my opinion desirable to do so. A rise of temperature is most unusual, as the drainage is so good; if granulations are too abundant during healing, they may be rubbed down with 50 per cent. solution of nitrate of silver on a fine hard mop after an application of cocaine. Some of the best results I have seen have been in cases in which spirit drops were used from the second or third day, in these patients the wounds appeared to remain much as they were left at the operation, healing almost without granulations or discharge. I do not aim at early dryness of the mucous membrane of the typanum if the Eustachian tube be in good working order, and though in process of time it will dry, yet hearing will not then be lost. The drainage-tube is used in diminishing

sizes until the wound is nearly healed, for it keeps the passage large and straight, so that the deeper parts are visible and accessible; when finally removed the orifice will in a few days return to its natural size. I am convinced that tight plugging over the windows in the tympanum, or scars involving these openings—and such always result from the usual operation—are responsible for the loss of hearing after complete mastoid operations, and that it has not hitherto been realised to what an extent hearing can be restored in the majority of cases.

The operation when performed with the view of effecting restoration of hearing is but little more difficult than the ordinary one, but the after-treatment needs much more attention in order that the two windows may not get damaged, nor covered with granulation or membrane, and if they can be preserved in all their elasticity a sound labyrinth and good hearing will probably be established, but should they become rigid, the delicate structures within will surely suffer and deafness will result. It does not seem to matter how extensive the disease in neighbouring parts may have been, for provided the labyrinth has escaped, the hearing can almost always be saved. I hold that operations which usually entail destruction of the hearing, and which have been so common in the past, are unsatisfactory; I also contend that a patent and perfect Eustachian tube should not be obliterated. Time does not permit me on this present occasion to deal exhaustively with all these points.

I have shown you several patients this evening. They have been operated upon by me in the way I have described in this paper, and mostly for dangerous disease. You have seen that they have no drums, that they are not disfigured—in some you cannot even discover where the incision was made. They can hear the voice, whisper, and even the watch. They have been cured of the suppurative disease which endangered their lives as well as their hearing, and for all practical purposes they can hear as well as the majority of ourselves. Some of them on whom both ears have been subjected to this operation hold posts where tests for hearing are applied, and yet are able to hear well enough to pass muster; some have obtained and held situations, and their employers have never known that they have undergone this operation, and that their drums have been removed. Others who have been discharged from their situations for deafness have been reinstated as soon as their hearing has been restored by the operation I have just described. I am speaking, observe, of cases of disease on both

sides, where it cannot have been possible that a sound ear was doing the work.

In conclusion, let me thank you for your patient hearing. I feel I have trespassed much on your valuable time, but in deference thereto I have left out much I would wish and ought to have said. I have given you but the barest outline, even omitting important details, but I hope I have said enough to give grounds for reflection and discussion.

The President said the communication of Mr. Heath's was a very important one. He had the privilege of seeing Mr. Heath do one of the operations that morning, and also of examining six of his cases which had been operated upon, and certainly the results with regard to hearing seemed to be surprisingly good. The methods differed considerably from the ordinary, and contained points well worthy of consideration; hence he suggested that it would be better to postpone discussion until the paper had been in the hands of the members.

Dr. Macnaughton-Jones agreed with the proposal, and asked that, in the description of the operation, Mr. Heath should state the specific pathological conditions in a certain number of cases which were present immediately before the operation, objective as well as subjective, also accurate statements as to measurements of hearing and character of hearing, and what improvement had been recorded for watch, whisper, and tuning-fork.

Dr. Jobson Horne asked, in addition, that Mr. Heath would kindly tabulate the 400 cases in order that they might be printed for distribution prior to the next meeting.

Mr. Tod asked that Mr. Heath would mention any previous treatment which had been tried, and the time during which it had been continued, and also how long the patients had suffered from deafness and otorrhoea.

Mr. Heath promised to do his best in those matters.

NINETEENTH ORDINARY MEETING.

Monday, February 6th, 1905.

THE PRESIDENT, DR. THOMAS BARR, IN THE CHAIR.

The following gentlemen were elected as ordinary members of the Society:

WILLIAM HENRY BOWEN, M.S.Lond., F.R.C.S.Eng.
ROBERT STURGEON COOKE, M.R.C.S.Eng., L.R.C.P.Lond.
JOSEPH WILLIAM LEECH, M.D.Durh., M.S., F.R.C.S.Ed.
HERBERT JAMES MARRIAGE, M.B., B.S.Lond., F.R.C.S.Eng.
ALEXANDER LOGAN MURISON, M.R.C.S.Eng., L.R.C.P.Lond.
SYDNEY RICHARD SCOTT, M.S.Lond., F.R.C.S.Eng.
MICHAEL A. TEALE, M.R.C.S.Eng., L.R.C.P.Lond.
CHARLES ERNEST WEST, F.R.C.S.Eng.
RICHARD WILLIAMS, M.R.C.S.Eng., L.R.C.P.Ed., L.F.P.S.Glas.

PRESIDENTIAL ADDRESS.

THE INSTITUTION OF RESEARCH WORK AND A PERMANENT MUSEUM IN CONNECTION WITH THE SOCIETY.

BY THOMAS BARR.

GENTLEMEN, I desire first to thank you for the great honour you have conferred upon me in electing me for a second year to the presidential position. I can only trust that my experience of the first year may lead to greater efficiency during the second.

At the annual dinner I took the liberty, in replying to the toast of the Society, of giving utterance to certain aspirations which, if not capable of immediate realisation, are, I think, worthy of further consideration. As only a comparatively small number of members were present at the dinner, I have thought it well to put on record and somewhat amplify these in a short address.

My first aspiration is, *the institution of organised and systematic research* in connection with the Society. I would ask, gentlemen, is

there any part of the body which presents problems so eminently demanding research as that with which we have to do?—difficult problems, complicated problems, we are sometimes apt to think insoluble problems. By means of organised and systematic research, we could grapple more closely with these difficulties and hope to solve at least some of them. As one subject well worthy of research, I would suggest the further elucidation of the pathological conditions present in ear disease, especially in the dry non-purulent middle-ear forms, by more thorough clinico-pathological methods, so as to help in differentiating their varieties more accurately, this differentiation being, I think, one of the main conditions of advance in treatment.

I am probably correct in saying that, since the time of Toynbee, the pathological anatomy of the ear has not received adequate attention in this country. There is probably no region of the human body so habitually ignored by the pathologist in the *post-mortem* room, and, yet, there is probably no part where it is so important in the interest of progress that such an examination should be made, and that thoroughly. The difficulty of the processes involved in both the macroscopic and microscopic examination of the ear, and the apparent lack of any practical result commensurate with the trouble, have, I fear, deterred many. The British type of mind is essentially a practical one, and is impatient to see definite and immediate fruit. It may be held that the otologist himself should see to the examination of any specimen coming into his hands; but this is with the most of us impracticable, as the thorough examination of the temporal bone and organ of hearing requires more time and technical experience than fully occupied otologists can usually command, while the operative work which now falls to the otologist renders it perhaps undesirable that he should engage in *post-mortem* work.

Might it not, therefore, be possible to make arrangements with gentlemen at important centres, say young men having in view the practice of otology, and duly qualified by pathological training for the work, by which temporal bones, sent by any member of this Society, might be examined anatomically and pathologically and reported upon? Instructions might be issued to members how to prepare such specimens for safe transmission; forms of questions might be furnished to elicit the clinical history of the person from whom the specimen was removed, when that is possible. Our dissections and specimens have hitherto lost much of their value owing to the frequent absence of such clinical records, and, if such an investigation

were to be profitable, this lack must, in future, be supplied. With the knowledge that specimens would be thoroughly utilised, members would be more on the outlook for suitable prospective cases, perhaps putting themselves in communication with physicians in general hospitals or in parochial or workhouse hospitals. In this way members might become aware of appropriate cases in such institutions—such as patients suffering from fatal diseases, and at the same time the subjects of deafness or ear trouble. These, when known, might be carefully examined clinically, so far as the ear and hearing are concerned, with the expectation that, if brought to the *post-mortem* room, the temporal bone or other implicated parts might be removed and subjected to careful examination under the light of the clinical records.

No doubt it might be difficult to find young pathologists fitted for this work. Such a pathologist must be specially interested in otology, and all the better if engaged in clinical work with the intention of following up the specialty. What a splendid foundation would a year or two of this work form for the life-work of the future practical otologist!

I am afraid, however, that such a scheme, to be successful, would involve the expenditure of money. We have, unfortunately, no research fund, such as is possessed by the Odontological Society, but I believe there are sources from which funds could be obtained to aid in such research if any of our members, or even suitable gentlemen outside the Society, were willing to undertake the work under the supervision and co-operation of this Society.

My second aspiration is *the formation of a permanent museum of anatomical and pathological specimens, including also instruments, models, and appliances for the teaching of otology*, a place to which members might resort for leisurely inspection and study. Speaking as a member hailing from the distant provinces, such a museum would prove specially attractive. Those of us who live at a distance from London have sometimes a few hours to spare on the day of the meeting, as I had lately, when, having no museum to inspect, I placed myself under the courteous guidance of the Librarian and surveyed the premises of the Medical Society. I was conducted for the first time to our library, which I am bound to say presented a very modest appearance, "cabined, cribbed, confined" within the limits of a few feet of shelving. In looking, however, at its very limited proportions, I reflected that many great things spring from small beginnings, and that these meagre shelves might present the "promise and potency" of a future great

library. I confess, however, that I did not keenly feel the lack of a great library, because, after all, most of us have very little difficulty in procuring, wherever we are, any book we may desire. I felt that the contents of a museum were the books I should have liked to peruse during my hours of waiting. There is no doubt that our department lends itself to the production of anatomical and pathological specimens, both microscopic and macroscopic. The temporal bone itself is a perfect mine of possible specimens, without taking into account the neighbouring cranial, nasal, and pharyngeal cavities. We saw what could be done in the splendid collection of the memorable museum of 1899, a valuable and permanent souvenir of which is to be seen in the volume prepared by Dr. Jobson Horne and Mr. Arthur Cheatle. The only pity was that such a unique collection, gathered together with so much labour, was open to inspection for only one short week.

I am confident that, if we had a place for their reception, we would soon have a collection forming a great attraction to our members. There are many sources from which we might draw. For example, if research work were set agoing the museum would naturally become the home of the specimens resulting from research. Each of us, I am sure, would contribute something from time to time. Donations from outside workers would, no doubt, be forthcoming, when it became known that this is a feature of the Society. Legacies from private museums might also be looked for in time. It is even conceivable that the Royal College of Surgeons might hand over Toynbee's historical specimens, which would form a grand nucleus, as well as a stimulus to future workers. In such a museum I would look forward to a department for instruments, into which every member of the Society who might devise something new would be expected to place a duplicate. Other otologists, not members of this Society, might be disposed to do the same. Instrument-makers, both at home and abroad, would, I believe, contribute to such a collection, and would, no doubt, if invited, be willing to show from time to time, perhaps on the days of our meetings, new instruments or appliances, bearing upon our department. This would especially prove a boon to country members, who would thus be saved the trouble of visiting instrument-makers' establishments in search of new and improved instruments. Even models, diagrams, casts, etc., might appropriately find their places in such a collection and be helpful especially to those of us who are engaged in teaching. The possibilities of usefulness connected with such a scheme are almost limitless.

I hope, gentlemen, that this idea will soon take a concrete form, and that a room, or even a part of one, may be procured in the Medical Society's buildings, where we hold our meetings, or in the neighbourhood, and that a beginning may soon be made, even in a small way. If the gentlemen who did so much to make the London Museum of 1899 so striking a success would take this matter in hand, our museum would soon become an accomplished fact, and from a small beginning it would ere long expand, and I would not be surprised were it ultimately to reach the dimensions of that of 1899—a permanent source of interest and education to all otologists.

Gentlemen, I do not invite from you to-day any expression of opinion regarding the practicability of these suggestions. I only ask you, especially the younger members, to think over them, and it may happen that at a future meeting more definite proposals may be laid before you. Dr. Hugh E. Jones, our senior Secretary, has already drawn out some excellent suggestions as to the collection, distribution and examination of specimens, and I hope that these may be considered by the Council at an early date.

A discussion was held upon a paper read at the last meeting by Mr. Charles Heath *On the Restoration of Hearing after the Removal of the Drum and Ossicles by a Modification of the Radical Mastoid Operation for Suppurative Ear Disease,* founded upon an experience of 400 operations.

Dr. Urban Pritchard said he hoped the author of the paper would not take his remarks too much to heart, but the paper appeared to him (Dr. Pritchard) to be rather an unfortunate one. It was open to a good deal of criticism. First of all, the very title of the paper led to the idea that otologists did not know that the post-aural operation in a very large proportion of cases was followed by improvement in hearing. The second point concerned numbers. He believed a great many would think with him that there must have been in the number of cases given a great many patients who did not require operation at all, the numbers were so great. If one took his own experience of the numbers of cases of suppuration which required operation, he believed most aural surgeons would differ very considerably from the author on that point. Again, the operation itself was said to be a modification. It was really such a very slight modification of Stacke's operation as to be practically a Stacke. He did not doubt it was carried out very nicely, and he

had more than one reason for believing that, as Mr. Heath was an excellent operator. Again, he certainly thought Mr. Heath must be sending his patients out too soon; it surely must be risky to send patients out as quickly as Mr. Charles Heath did. Lastly, he thought it a pity that the paper was published in the *Lancet* before the discussion at the Society had ended.

Mr. Macleod Yearsley said that when Mr. Heath showed his first cases on December 7, 1903, he (Mr. Yearsley) pointed out that the cases appeared to him to be merely examples of Stacke's operation, and he could not say that he had since changed his opinion. There were several points which occurred to him in which Mr. Heath laid himself open to criticism, and it would be very interesting to hear what other members had to say about the matter. First of all he would ask Mr. Cheatle's opinion as to the locality of the antrum. Did he find that the antrum in 60 per cent. of the cases was situated entirely in the pars petrosa? With regard to the operation itself, he had not been able to see anything novel about it except the india-rubber head-sheet, if that could be considered a part of the operation. But there were one or two special things he wished to mention. With regard to the precautions for avoiding the wounding of the temporal fascia, he thought they were precautions which all otologists had taken for some years past, and it was specially mentioned in at least one text-book on the subject. Another point was the following: Was it, in the experience of the other members of the Society, possible to ascertain completely the condition of the antrum by exploring about with a small bent probe through a hole just big enough to admit the probe? A further point he desired to mention was with regard to the removal of the projecting parts of the stapes by means of small pincers. It was easy to talk about, but he would like to know whether Mr. Heath had succeeded in doing it in every case. If not, why did he not leave the stapes alone? What was the use of chipping it off? Another question was one upon which Dr. Pritchard had already touched, namely, the grounds for the operation on all the patients who had been shown to the Society. He would like to know how long Mr. Heath treated his patients before operating on them. On inquiry he had been told that he only treated them a week, or at most a fortnight. At least one woman said she had been ill only a fortnight, having had apparently an attack of acute middle ear trouble; and if she had not been operated upon he (Mr. Yearsley) thought she might have recovered her condition, with normal hearing.

Mr. Chichele Nourse said it would no doubt be admitted on all sides that the radical mastoid operation as usually performed was not absolutely perfect—that is to say, not uniformly satisfactory in its results; hence many differences and variations were to be met with both in the details of the operation itself and in the after-treatment. It appeared to him that the weak points in the operation, as it was performed at present, were the immense length of time which often elapsed between the operation itself and the complete healing of the inside parts, and secondly the occasional tendency to narrowing of the external meatus. Therefore he thought one should welcome any suggestions by which these defects might possibly be obviated. It appeared to him that the real question under discussion was whether the procedure suggested by Mr. Charles Heath was a step in advance on the ordinary way of doing a Stacke or not. If members brought into the discussion also the point whether those cases upon which he founded his paper should or should not have been operated upon, it would be opening another very wide field, and one in regard to which it was known opinions were most divided. For instance, at the recent International Otological Congress, if he remembered aright, Dr. Dench, of New York, read a paper in which he advocated operating upon every case of chronic suppuration in the middle ear. If that were made the subject of discussion as well, one would be led away from what he considered to be the main question. Through Mr. Heath's kindness he had had the opportunity of seeing that gentleman operate in two cases since the last meeting, and after reading the paper he was very much interested in several points in the operation which appeared to be of advantage. It seemed to him that Mr. Heath's procedure differed from the usual operation, not in principle, but simply in attention to certain details. For instance, there was the special kind of flap, which was stitched back to the periosteum which had not been pushed aside out of the way. Some of the suggestions made by Mr. Heath the speaker had been acquainted with, and had adopted from him, for some time; such as the use of spirit drops and the introduction of a drainage-tube into the meatus instead of tampons. He also thought it was certainly of great importance that the question of the preservation of hearing power should be more considered than it had been in doing that operation. As far as he had been concerned he had been in the habit of saying to patients about to have the operation performed that the operation was one which was necessary for the saving of life, and although the hearing might possibly be improved after

the operation, yet the operation itself was not done for the purpose of improving the hearing, but for more important reasons.

Dr. William Milligan said he had read Mr. Charles Heath's paper with very considerable interest, and he thought that, in many respects, it was a most unfortunate paper. He thought Mr. Heath started from premises which were entirely wrong. In the first place, the paper went so far as to say that by performing the ordinary radical operation one obtained bad results so far as the hearing power of the patient was concerned, even if one did not actually destroy hearing by it. He was sure it must be within the experience of most members of the Society when he said that the radical operation as performed by most otologists, probably by all, was an operation which, in a very large proportion of cases, was attended by distinct improvement in hearing. To start a paper on the assumption that it was to go one better than anybody else in a matter of that kind was very unfortunate, and that it should emanate from such a society as the Otological was also very unfortunate. The very large number of cases upon which Mr. Heath had operated was rather staggering. He (Dr. Milligan) was not prepared to say definitely in how many cases in one's out-patient clinique it was necessary or not to do the operation, but if one's own personal experience was any guide at all, or of any value in a matter such as that under discussion, he certainly did not think that more than 4 per cent. of the cases which came forward to one's clinique were cases in which an operation was necessary. Therefore, if Mr. Heath had operated upon 400 cases within a short time, there must be an enormous clinique at the Golden Square Hospital, which one had always understood was a hospital for diseases of the throat. He would also criticise some of the statements Mr. Heath made in his paper. They appeared to be excellent statements to make upon paper, but statements which it was exceedingly difficult, if not impossible, to carry out in practice. In the first place, Mr. Heath performed, for practical purposes, what might be regarded as a modified Stacke's operation, and that, as everyone knew, was an operation limited to a comparatively small portion of the mastoid area. In those circumstances, how was it possible in performing such a limited operation to be always certain that one saw the margin of the foramen ovale or the fenestra rotunda? Mr. Heath said he carefully left the mucous membrane round those two foramina. His own experience in the matter was that unless a very large part of the posterior wall of the bony meatus was cut away it was not possible to even see the fenestra

rotunda, and, therefore, with Mr. Heath's limited operation, it did not seem to be a matter of practical politics to deal with it as mentioned in the paper. If the mucous membrane around those foramina was to be left, why should the membrane of the middle ear be touched at all? One could hardly imagine that the pathological process had invaded the mucous membrane of the anterior part of the tympanum proper, and had left the mucous membrane immediately round the foramina in such a state that it did not require interference. Then it seemed to him that in the matter under discussion members were exceedingly handicapped because they had no definite data as to what was the preliminary treatment of those patients, and how long the disease had lasted, although he certainly understood at the last meeting that that information was to be forthcoming for the present meeting and in time for the discussion. He knew it was a big undertaking to ask any member of the Society to tabulate 400 cases, but he thought, in fairness to the Society and in fairness to otology in general, Mr. Heath should be asked for the past histories of, say, a couple of dozen consecutive cases out of the 400, so as to put the Society into a position to discuss the matter scientifically.

Mr. C. A. Ballance remarked that so much had been said on the subject that he would have very little to add. He felt absolutely unable to discuss the paper without having attached to it details of a certain number of consecutive cases, say two or three dozen. He sympathised with the enthusiastic way in which the paper was written, and indeed that was the only point in regard to which he could praise the paper in any way, or which appealed to him at all in reading it. Very often when one wrote enthusiastic papers in early life one found there was a great deal in them which was not worth much later on, but there was some little part which might be useful in after-life. It was very difficult to say anything about the paper, because he felt very strongly about it. Mr. Heath's description of the operation was a description of a Schwartze-Stacke operation imperfectly performed, and for that paper to be printed in the *Transactions* would cause their colleagues in Germany to feel deeply hurt. He did not think that any English otologist should write such a paper without reference to the great work which had been done in Germany. Had Mr. Heath never heard of the Schwartze-Stacke operation? Those members of the Society who had had the privilege of making friends in Germany must feel on reading the paper that the writer was not accurate and was not just to the work of others. With regard to the operation itself,

he could not conceive that when disease was present, except the very slightest form of disease, it could possibly be removed except in the manner recommended so many years ago by Schwartze. As to the incision itself, he regarded that as of little importance. One of the recommendations of the paper was that the incision produced no disfiguring scar, but the results of operations performed by well-known otologists left no disfiguring scars. With regard to the flap operation, the way in which the flap was formed was exactly as described by Stacke in 1889. As to the restoration of hearing after the operation, Mr. Heath must be quite unaware of the results of the radical mastoid operation. The first tabulated results were given by Schwartze a great many years ago, and last year, for a certain purpose, he (Mr. Ballance) examined some twenty or more consecutive cases, old cases of his own which happened to turn up, and in every case there was improvement in hearing, and in some of them there was most remarkable improvement, so remarkable that he had no idea previously that there was so great a benefit to the hearing after the complete post-aural operation. He did not wish to say, as Mr. Heath did about his own cases, that his results were exceptional; he did not think they were. All his friends who did that operation obtained practically the same results. A gentleman who had just spoken in favour of Mr. Heath's operation said that one of his advantages was that there was no narrowing of the meatus afterwards, and that there was great diminution in the length of time required for healing as compared with the old operation. He (Mr. Ballance) had no experience of narrowing of the meatus afterwards when the Stacke method was properly carried out, and he had no experience of the healing process taking a long time except in those cases in which it was impossible to remove all the disease.

Dr. Frederick Spicer said he desired to congratulate Mr. Charles Heath most heartily upon his results. If such results could be obtained, he failed to see the justification for submitting patients to two operations. Indeed, until the commencement of the debate, he was under the impression that that procedure, so enthusiastically introduced and so injudiciously supported, had long been given up. He could only say that he felt he owed to Mr. Heath a debt of gratitude, because since he had adopted that gentleman's method the time during which his patients had been under treatment had been reduced to one half. As to whether the cases were proper ones for operation or not, he submitted that that was not on the paper.

Dr. H. Macnaughton-Jones said he did not agree in the least with two of the speakers who had preceded him. He thought there was a question of even greater importance than the technique of the operation, and which must necessarily be involved in the discussion which was taking place. He confessed that, looking back for a period of thirty-five years of aural work, and knowing of what that work had consisted, he was certainly startled to learn that within a comparatively short time it was necessary to perform 400 radical operations, as he supposed they must be called. It was so altogether out of accordance with his own experience that he naturally asked how it came about. He believed he was right in assuming that Mr. Heath had performed 400 of those operations in three years. (Mr. Heath: No, sir, seven or eight years.) Dr. Macnaughton-Jones, resuming, said that of course if the period was seven or eight years that altered the question. He understood certainly that the period stated was much shorter than that, and he would now find it difficult to narrow the matter down to one of figures. But he would ask Mr. Heath whether it was not the fact that he was requested at the last meeting to supply some reliable statistics before any attempt was made to discuss the paper. A gentleman had just said that Mr. Heath was to be congratulated on his results. But how was the Society to know anything of the results of an operation if they knew nothing of the antecedent conditions which preceded that operation? Mr. Heath said that some 17 per cent. of his cases of suppurative otitis media required operation. (Mr. Heath: Somewhere about that.) So that 400 operations, allowing 25 per cent. of his cases to be suppurative otitis media, would work out at something like 9400 aural cases. Therefore it came to be a matter of extreme otological importance to ascertain the time which had elapsed during which those operations were performed. Of course, suppurative otitis media did not make up the entire clinique of an otologist. Would Mr. Heath tell the members roughly what was the proportion of suppurative otitis cases he estimated he had had? To have had such a number of cases in a short time must mean an enormous otological clinique.

Mr. Heath said he thought Dr. Macnaughton-Jones' calculations were in error.

Dr. Macnaughton-Jones maintained that they were absolutely correct. If Mr. Heath would work out 17 per cent. of cases requiring operation, and 400 operations, he would find that there would have to be some 2350 cases of suppurative otitis media, which, allowing 25 per cent. of such cases in his clinic, would give

the total number of ear cases as over 9000. It was futile for the members to discuss that paper. He was not one who could do so from the operative point of view, but he certainly could from the aspect of therapeutic measures in otology, and looking back on a large experience, he could not conceive of such a condition of things as Mr. Heath had brought forward.

Dr. Hemington Pegler expressed regret at the turn the discussion on the paper had taken, and he appealed to Professor Pritchard, Dr. Milligan, and Mr. Ballance, all of them kindliest of men at heart, to moderate the severity of their criticisms before suffering them to go forth from the Society. He imagined Mr. Heath must have taken it for granted that the members were so well acquainted with the operations of Schwartze, Stacke, and Zaufal as to render any allusion to those illustrious surgeons unnecessary in a short paper on certain details in carrying out their principles; he hoped Mr. Ballance would allow this. Without the invention of those great pioneers, this paper would not have been possible, a fact which he thought its author fully recognised, far from laying claim to any fresh invention of his own. He (Dr. Pegler) had been impressed by Mr. Heath's enthusiasm in paying attention to important minutiæ in operating, to the witnessing of which he freely invited his friends. Mr. Heath's recommendations for the protection of the internal wall and fenestræ, the reduction of exuberant tissue growth with a view to better hearing, the maintenance of an ample meatus by the aid of india-rubber tubing, not to mention many useful modifications in the pattern of instruments, the speaker had adopted with advantage. He thought such points lent themselves for fair and open discussion, rather than the matter of statistics, which did not enter into the question of the operation itself or form any part of the paper.

The President said, before asking Mr. Heath to reply, that no doubt the weakness of the contribution—which he thought had merits, notwithstanding all that had been said—was the absence of precise scientific details. Unfortunately, Mr. Heath had not given sufficiently detailed notes of each case, and his paper had lost a great deal by the lack of these, such as—as had been pointed out by others—the precise condition of the hearing before operation and after, the duration of the ordinary treatment before operation, as well as the exact pathological conditions then present. Had fuller information on those points been given in a tabulated form, Mr. Heath's paper would have been of much greater value, and would have met with less hostile criticism from members. Mr.

Heath was an earnest worker, but he had suffered in this case from lack of details which were always required when one brought forward new methods. He was sorry that some of the points in the paper had not been taken up by speakers on their merits; for instance, the question of packing after operation was a very important one. Mr. Heath seemed to obtain excellent results without packing. His (the President's) experience had been that judicious and careful packing was essential to get a good result. He would have liked very much to have heard some members refer to that point. Could one get permanently open epithelial-lined cavities without packing? His own experience was that, as a rule, one could not. Packing carefully and continuously seemed necessary to insure a clear aditus and a clear post-meatal cavity. He then asked Mr. Heath to reply.

Mr. Charles Heath said it was difficult to reply under the conditions in which the discussion had been carried on, for very few of the speakers had discussed the paper, but some other principle involved. Dr. Pritchard referred to the numbers and to the question whether the patients all needed operation. He would give the statistics as they were taken out for another occasion, and they were all he had available: duration of treatment of those patients before operation, average 13 months; duration of disease, average 15 years; percentage with improved hearing, 84. So much had the improvement in hearing been appreciated by the patients that when they had both ears bad and he had operated upon the worst one, he was constantly begged to do the other. That showed that they could not have suffered much in the after-treatment or in any other way. With regard to the point raised by Dr. Pritchard as to the risk of sending the patients out too soon, had there been any risk in doing that he would have found it out long ago; it was a matter which had been gradually evolved. He had on one occasion, and one occasion only, to regret sending a man out, and that was due to an oversight which hardly came to his cognizance. A man was up from bed without any temperature, and had been up for some days and he allowed him to go home without first seeing his chart. As a matter of fact, the chart was not handy when he gave permission for him to go home. Mr. Yearsley had inquired about the period of treatment. It varied from three weeks to three months.

Mr. Yearsley said he wanted to know the treatment before the operation.

Mr. Heath said he had already given that—thirteen months. None of his cases were operated upon unless they had urgent sym-

ptoms, or were under orders to come in which had been in existence for over six months. It was past midsummer last year before the last of his previous cases came in which was not urgent. Those who had urgent symptoms had a prior claim over those who had chronic symptoms. Mr. Nourse criticised his paper rather kindly, for which he thanked him. Dr. Milligan referred to the hearing in a large percentage of the cases. He (Mr. Heath) was unaware that good hearing in as many as 84 per cent. had been produced before. He believed Dr. Milligan adopted the skin-grafting method, and he could hardly imagine that that was one which lent itself most to the restoration of hearing, because laying a graft over the inner wall did not transmit sound very effectually. With regard to seeing the fenestra, anyone when he took the tube out could see the whole cavity without using the speculum at all. He had given up the speculum; his tube kept the meatus so large that every part of the wound was visible; he did not need the speculum. With regard to the reasons for leaving the mucous membrane near the fenestra, his experience had previously been that if he wounded the mucous membrane near the fenestra the healing process would result in a scar, and in the healing of those scars there was a dragging on the fenestra, which would interfere with the hearing. That was one of the reasons why he left it. In the expectation of restoring the hearing, he did it in every case in which there was not nerve deafness. Mr. Ballance had referred to his not having mentioned continental friends. He referred to Stacke. He did not know after whom he should call this particular operation; it was very difficult; but he referred to a modification of Stacke, and if Mr. Ballance preferred to call it by some other name, he (Mr. Heath) had no fault to find with him. He agreed that the pioneers in those operations were our continental friends. He believed Mr. Ballance said the operation could not be done in the space allowed by the incision. But there were many present who had seen him do it. The principle of the operation was to go straight for the antrum, and having found that, he acted according to what he had to do, for he removed all the disease, as the cases he had operated upon showed. Dr. Spicer kindly supported him. He had on several occasions seen the operation, and he believed Dr. Spicer followed his method. In reply to Dr. Macnaughton-Jones, he ought to have given in his statistics, but he had not the opportunity of getting all the statistics he could have wished. But the crude ones he had now were collected for another purpose. They referred to thirteen months before operation, on the average. He wished members had

discussed more the methods of the operation, but they, of course, discussed it in the way in which they felt disposed, and he hoped he had replied to all of them.

At this stage of the proceedings the PRESIDENT said it was known to members that one meeting in the year was held outside London, and hitherto the extra-Metropolitan meetings had been not the least successful. They had already been held in Liverpool, Edinburgh, Dublin, and Glasgow. This year the Society had been fortunate enough to have received two cordial invitations, one from Manchester and the other from Leeds. With such desirable invitations the Council had some difficulty in coming to a decision, but it was ultimately agreed to accept the kind invitation conveyed by Dr. Milligan from Manchester for this year, with the fond expectation that the invitation from Leeds, conveyed through Mr. Whitehead, would be open for the following year. The meeting would be held at the beginning of June; the exact date would be intimated later on by Dr. Milligan. He was sure that, under the auspices of Dr. Milligan, the Manchester meeting would prove a great success.

TWO CASES OF LABYRINTHINE SUPPURATION RECENTLY OPERATED ON, WITH SPECIAL REFERENCE TO THE PATH OF INFECTION.

BY WILLIAM MILLIGAN.

CASE 1: *Synopsis.*—Patient, male, aged thirty-seven. Left-sided suppurative middle ear disease of twenty years' duration. Main symptoms: deep-seated pain in the head, constant tinnitus, increasing deafness, and fœtid discharge. Radical mastoid operation; exposure of outer labyrinthine wall; fistula in horizontal semicircular canal; sprouting granulations; enlargement of fistula; subsequent packing. Complete recovery so far as fresh symptoms were concerned.

CASE 2: *Synopsis.*—Patient, male, aged forty-six. Duration of disease over twenty years. Latterly severe headache, inability to work, constant tinnitus, intermittent attacks of vertigo, sickness, fairly well-marked facial paralysis, profuse fœtid discharge from the left ear. Radical mastoid operation; large fistulous tract leading through the fenestra ovalis into the vestibule, from which pus oozed; enlargement of the perforation, curetting, subsequent packing. Uninterrupted progress; recovery.

Supervention of Acute Labyrinthine Suppuration in a case of Chronic Suppurative Otorrhœa.

By Herbert Tilley.

The patient was a male, aged twenty-eight, who had suffered from chronic otorrhœa in the left ear for six years. For three weeks he had suffered from severe earache which radiated over the temporal region and had caused much loss of sleep, so that when he applied at the hospital the patient appeared to be very weak and ill. No tinnitus was complained of, but at times he felt dizzy without being actually giddy. On examination the patient was found to be completely deaf in the left ear both to air and bone conduction. The meatus was blocked by a polypus, which, however, permitted the discharge of a small quantity of pus. There was tenderness on deep pressure over the mastoid, but no œdema or signs of inflammation in the soft parts covering that region. The temperature was 102·2° F. on admission.

The radical mastoid operation was performed and the antrum found to be filled with caseated pus. Upon the removal of this a small dark spot was seen over the situation of the external semicircular canal, and on probing this pus flowed in a pulsating stream from it. The fistulous opening was enlarged and the canal explored until healthy granulation was reached and no more pus escaped. A light dressing was applied to this area as well as to the larger antro-tympanic cavity and the posterior wound was sutured.

The patient made an uninterrupted recovery and the bony wound was now (February 6) quite dry. The operation was performed on November 21, 1904.

Mr. Hugh E. Jones wished to refer to a point which had already been raised before the Society, namely, the precise degree of importance to be attached to vertigo as an indication for operation. In communications referring to labyrinthine suppuration it would be well if special attention could be paid to the question of vertigo. One came upon many cases where the vertigo was a symptom and where it was not possible to establish the fact of a sinus in the labyrinthine wall, so that we were constantly in a difficulty since that question had come so much to the front. Notwithstanding the fact that there might have been vertigo, so many of them got well after the ordinary complete post-aural operation that there was great difficulty in assigning the right degree of importance to that

symptom. In Dr. Milligan's first case vertigo was not mentioned, though it was in the second. In Dr. Tilley's case slight dizziness was referred to. Vertigo might be absent in advanced cases of suppuration and necrosis, just as it disappeared after operative destruction of the labyrinth, and, on the other hand, was often present when there was no real or permanent lesion of the labyrinth.

Mr. A. L. Whitehead asked whether nystagmus had been observed in Dr. Milligan's and Dr. Tilley's cases. In a previous discussion on a paper by Dr. Milligan on labyrinthine suppuration he contributed some statistics in which nystagmus was not a common symptom, although in some of the continental statistics it was mentioned as occurring fairly frequently. To some extent it was his own fault, as he did not systematically look for it. He believed it was a horizontal nystagmus which could be elicited on lateral movements of the eyes, and which did not present itself in the ordinary way. Was nystagmus looked for in the present cases, and if so, was it present?

Dr. Urban Pritchard said that with regard to the amount of vertigo by which to diagnose a definite lesion rather than an external irritation of semicircular canals, each case must be judged on its own merits. In the last edition of the *Archives Internationales de Laryngologie, d'Otologie, et de Rhinologie,* Dr. Laurens related a very interesting case where a piece of curette was broken off and lodged in the external semicircular canal during an attempt to remove a foreign body. There was tremendous vertigo, besides the acute mastoid symptoms, and when he opened the antrum he found the piece of steel firmly fixed by adhesions in the semicircular canal. On its removal the patient lost all the symptoms.

The President said that the complete inspection of the inner or labyrinthine wall of the tympanum was a somewhat difficult matter. No doubt a fistulous opening in the external semicircular canal, as existed in one of Dr. Milligan's cases and also in Dr. Tilley's case, was fairly easily seen and dealt with. But when there is a communication with the labyrinth, below and behind, just in front of and concealed by the ridge formed by the lower part of the posterior osseous wall of the meatus during the radical operation, it is more difficult to see and operate upon it. No doubt if the posterior wall were chiselled away as far as the floor of the meatus, all parts of the inner wall of the tympanum might be brought under review, but the Fallopian canal stands in the way of this thorough removal.

Dr. W. Milligan said the President was present when he operated upon Case No. 1, and saw the fistula in that case. He had stated in the synopsis everything which was of importance about the two cases. The vertigo in such cases might be due to the internal ear lesion itself, but in many of those old-standing cases it was simply due to chronic labyrinthine congestion (which cleared up after the radical mastoid operation), or to the pressure of inflammatory products upon the fenestræ. He had noticed that patients were sometimes dizzy before the radical mastoid operation, and that after the operation the dizziness cleared up, even though nothing had been done to the labyrinth. He believed horizontal nystagmus was present in his second case, though it was too slight to be very certain about it. Both cases did very well indeed. The hearing was destroyed beforehand, and of course there had been no return of it. The patients previously had troublesome sickness, dizziness and pain in the head, and it was incumbent upon the aural surgeon in those old chronic cases to make a careful inspection of the labyrinthine wall.

Dr. Herbert Tilley said his patient was an Italian and could not understand English, and it was therefore difficult to get any accurate details of the history of his trouble, but it had been possible to ascertain that he had been a little dizzy before coming into the hospital, but there had been no definite vertigo, neither was there any nystagmus when he was tested before the radical operation was performed.

"Urticaria of the Drum."

By L. A. Lawrence.

The patient was suffering from chronic non-suppurative middle-ear disease; a mere touching of either tympanic membrane produced marked and rapidly extending hyperæmia. The condition, Mr. Lawrence said, might be called "urticaria of the drum."

Dr. Edward Law regarded the case as both curious and interesting. He had the opportunity of stimulating the tympanic membrane on one side, and of seeing it stimulated on the other side by Mr. Cheatle, and the appearance of each area of redness after an interval of five or ten minutes was more like a blood-vesicle than a localised hyperæmia. If it were hyperæmia he suggested a better name than "urticaria of the drum" would be "erythema traumaticum of the tympanic membranes." It might be considered a blush of

anger on the part of the membranes and their resentment of the stimulating irritation of the probe.

A Few Notes on 250 Temporal Bones of all Ages Sectioned Vertically Through the Antrum and Mastoid Process.

By Arthur H. Cheatle.

The outer antral wall.—As the outer antral wall has a different development from the mastoid process, and on account of its surgical importance, it demands a separate description.

In fœtal life and early childhood up to about four years of age the wall is formed by a thin layer of compact bone lined with fine cells having an inward direction. These fine cells can be differentiated from other coarser cells all through life, and therefore should be described as part of the antrum. After the age of four years the outer wall varies and may be either dense, densely cellular, or coarsely cellular, the variety apparently depending on changes in the outer compact layer.

In the 210 specimens above the age of four years the outer wall is: (1) dense in 97, (2) densely cellular in 49, (3) coarsely cellular in 64.

The thickness of the outer antral wall varies considerably. In no instance is it more than three quarters of an inch, while the average measurement taken from the region of the spine to the outer antral cells (the deepest part) is from a half to five eighths of an inch.

The supra-meatal triangle as a guide to the antrum.—In infancy and early childhood the antrum is regular in position; later in life there is no absolutely reliable guide. In forty-one specimens the antrum is wholly, or in great part, above the triangle. In nine the triangle leads to the middle fossa. The triangle is a good guide in the great majority.

The supra-meatal spine, when present, leads more to the apex of the antrum; it is not always a sure guide to the cavity.

The petro-squamosal sinus is evidenced in twenty-one cases.

Forward lateral sinus.—In early life the sinus is horizontal and lies below the level of the antrum, becoming more vertical and approaching the cavity about the first and second years. The first very forward sinus among the specimens is the right bone of a boy aged nine. In no instance does the sinus completely shut out the antrum; in two specimens the posterior part is overlapped. Forty-five specimens in all showed a forward sinus.

Types of mastoid process.—Specimens showed the following types: (1) entirely cellular, (2) densely cellular, (3) diploetic, (4) diploetic and cellular, (5) diploetic and dense, (6) dense.

Atresia of Left Auditory Meatus and Deformity of Auricle: Operation.

By W. H. Kelson.

R. G—, a man aged forty, was shown at the last meeting, suffering from atresia of the left auditory meatus and deformity of the left auricle. Bone conduction to C tuning fork was normal and equal on both mastoids; aerial conduction very defective. Eustachian orifices and tubes appeared to be normal on both sides; on inflation on the left (defective) side the patient felt a bulging close to the articulation of the jaw. His hearing in the right ear was getting steadily worse and the patient was anxious to have an attempt made to improve the left, though it was pointed out to him that the chances in his favour were very slight. An incision was made two inches in length at the line of junction of the left auricle with the side of the head posteriorly and the bone was exposed. A smooth depression was found corresponding in position to the situation usually occupied by the supra-meatal spine and fossa; of the former there was no trace to be found. A little in front of this depression a small fissure was to be seen having a vertical length of about a quarter of an inch; this was traced inwards, but terminated blindly in the bone at the depth of half an inch. Anteriorly a membranous structure was exposed, but on manipulation of the jaw this was considered to be part of its joint capsule and so was left alone. No guiding landmarks being visible, it was thought best to discontinue the exploration, so the wound was closed and healed by first intention. The hearing remained the same as before the operation.

Tumour (Endothelioma) of External Auditory Meatus.

By E. B. Waggett.

The patient, a man of robust build, aged forty-three, came to the hospital in March, 1903, complaining of chronic otorrhœa in the right ear, and of otorrhœa of a few weeks' duration in the left ear. He had recently recovered from an attack of erysipelas of the head. The left external auditory meatus was found to be almost blocked by a smooth, hemispherical, sessile tumour, growing by a broad base from the floor close to the orifice. In size it

equalled a small pea; it was firm to the touch, and the skin covering it, natural in colour, showed the distended orifices of glands. A few fine hairs grew from it.

The tumour was removed with a knife, and microscopical examination showed that the space between the hair-roots was occupied by an abnormal tissue. This consisted of a finely fibrillar matrix, and of definite columns and groups of epithelioid cells. The latter were spherical or polygonal in shape according to the degree of mutual compression, and in all instances the individual cells were separated from one another by the fibrillar matrix. In some portions of the section the columns were replaced by elongated spaces lined by the epithelioid cells.

Endothelioma was diagnosed, and part of the floor of the meatus was removed. So quickly did the meatus become filled with redundant granulations that a radical operation was performed without many days' delay. A post-aural operation was performed and all the soft and cartilaginous structures of the meatus were removed. Grafting of the very large wound which resulted was only partially successful, but a rubber tube was employed and healing took place without stenosis. Now, almost two years after the operation, there is no recurrence. No granular enlargement was detected at any time.

It was proposed by Mr. Cheatle, seconded by Dr. Jobson Horne, and agreed that the specimen be referred to the Morbid Growths Committee, Dr. Jobson Horne remarking that the case reminded him of one shown to the Society by Mr. Cheatle, about which a report by the Referees to the Pathological Committee will be found in the fifth volume of the *Transactions*.

Mr. A. Cheatle said in the case of endothelioma which he reported a couple of years ago he turned the whole ear forward and removed the cartilaginous meatus, the tumour seeming to shell out. After the operation a large hole was left, which he grafted, with very good results. The lady had enjoyed good health since, her hearing was good, and there had been no more trouble or pain.

Notes of Two Cases of Deafness following Mumps.

By Richard Lake.

Case 1. Mrs. A. M——, aged thirty-five. Six weeks previous had had mumps, was not very careful, and did not stay in bed. A week afterwards had an attack of sudden deafness, with vertigo and

sickness, on the left side, which was noticed in the morning. There was no pain or discomfort. No visible change in the ear. Severe tinnitus.

Particulars of hearing.—Left ear: *Weber,* left. *Voice* and *Whisper,* 0. *Acoumeter,* on mastoid, probably reflected. *Galton's whistle,* 3·4 (16,500). *Rinné* (*C and* C^2), negative. *C on mastoid,* minus 35 seconds; C^2, minus 20 seconds. *Air conduction,* no fork heard.

Case 2. Unilateral Deafness after Mumps. A young lady, aged seventeen, had mumps three and a half years before, immediately after which she was attacked by unilateral (right side) deafness. There was no discharge at any time. The malleus was mobile, and the cone of light was divided.

Particulars of hearing.—Right ear: *Acoumeter,* half an inch. *Voice,* four inches. *Whisper,* not heard. *Rinné C,* negative. *Rinné* C^2, negative. *Bone conduction,* minus ten seconds. *Galton's whistle* and *Gellé,* negative. *Air conduction* (3*C to C*), not heard. C^1, minus 35″. C^2, minus 30″. C^3, minus 22″.

Deafness of the nervous type is a well-known sequela or complication of mumps. In the two cases reported it was in each case a sequela, the first was due no doubt to metastasis, though precisely why there should be a tendency for involvement of those particular structures of the ear in this disease is not easy to explain, but it may be assumed in the first case that the vessel plugged was probably a large branch of the internal auditory artery, for as far as one was able to judge there was in that case absolutely no sense of hearing left at all on the left or affected side, though the acoumeter was heard on the mastoid. If the patient heard it in the concha, as she thought she did, there must have been some fragment of the auditory nerve still active, and when the bone conduction is reduced, as it was here, by thirty-five seconds, the probabilities are that it is the other side which is active.

In the second case there was considerable doubt as to what actually was the state of the ear three weeks after mumps. It was a case of no obvious nerve lesion, Rinné negative both with *C* and C^2, Gellé also giving a negative result, this with the small minus bone conduction showing a simple fixation of the stapes.

Mr. Yearsley asked how Mr. Lake treated the first case. Did he use pilocarpine? Dr. Dundas Grant some time ago mentioned that he thought pilocarpine (or jaborandi) was a specific for mumps, and it would be interesting to know if it had any effect upon the deafness due to mumps. He wished to remark upon the careful

particulars which Mr. Lake had supplied in connection with the case. One, unfortunately, rarely found cases brought forward with such careful accounts of the tuning-fork reactions and tests. It was a pity there was not some universal method of taking those tests adopted by otologists.

The President remarked that mumps as a cause of deafness was a very interesting question. Toynbee believed that it was a very common cause, most frequently, however, affecting only one ear. The President had himself seen several instances where the lesion was undoubtedly labyrinthine, leading in one case to dumbness. Whether in such cases the labyrinthine mischief was due to the immigration of micro-organisms associated with mumps, or to metastasis, as in the cases of the mammæ and the testicles, is problematical. These cases are quite different from and more interesting than those in which middle-ear mischief follows mumps when it is due to direct extension from the parotid to the meatus or middle ear.

A Case of Hernia Cerebri et Cerebelli, the Result of Acute Encephalitis.

By Hunter Tod.

John M——, aged nine, was seen in the out-patient department in the middle of May, 1904, suffering from acute otitis media of the left ear. Paracentesis was performed. The boy was seen twice a week. Under treatment the otorrhœa rapidly diminished, and the perforation appeared to be healing. The boy, however, looked ill, and the district nurse noted that frequently there was considerable pyrexia. He was admitted into hospital on June 4. The otorrhœa had now ceased and the perforation had almost healed. There was no pain, tenderness, nor swelling over the mastoid process. The temperature was 104° F., and there was some drowsiness with frontal headache. Typhoid fever was suggested, but Widal's reaction was negative and no sign nor symptom of that disease could be discovered. There was no vomiting and the optic fundi were normal. The temperature varied from 102° to 104° F.

On June 15, owing to the continuous fever, Schwartze's operation was performed and the lateral sinus was exposed. The antrum was normal, but the mastoid cells adjoining the lateral sinus were filled with pus, and the sinus itself covered with pus and granulations. There seemed to be sufficient reason to warrant

opening the lateral sinus. The internal jugular vein was ligatured in the neck before the sinus was explored. The lateral sinus was not thrombosed, but a large area of its wall lying next to the mastoid cells was much thickened and softened with granulation tissue. The patient had two rigors within thirty-six hours after the operation. The drowsiness increased and the pyrexia continued. The lateral sinus bulged into the wound, suggesting intra-cranial tension. There was considerable pain in the left leg, which was kept flexed. Although meningitis, rather than an intra-cranial abscess, was suspected, the boy was operated on a second time on June 21. A large area of bone over the temporo-sphenoidal lobe and cerebellum was removed. On incising the dura mater behind the lateral sinus a considerable quantity of serous fluid, tinged with blood, escaped. The cerebellum, which was very friable and of a dark red colour, bulged into the wound; it was explored, but no abscess discovered. Similarly the dura mater over the temporo-sphenoidal lobe was explored, with the same result. The brain substance was obviously very acutely inflamed.

The hernia cerebri et cerebelli increased rapidly, so that ten days after the operation it was the size of the boy's fist. It was principally composed of the cerebellum. The patient now became very irritable, with intervals of drowsiness, and was continually crying out from pain in the leg, which was kept flexed. He lay curled up in bed and no movement could be tolerated. The head was kept retracted and rigid, and the pupils were contracted. The pyrexia varied from 102° to 104° F. All nourishment was refused and emaciation became extreme. Ten days after the second operation death often seemed imminent from what appeared to be definite meningitis.

The boy, however, recovered slowly and by the beginning of July could enjoy his food and began to take an interest in his surroundings. Several times, during the first month succeeding the operation, the cerebellum was tapped and a considerable quantity of cerebro-spinal fluid escaped, which seemed to give relief.

By the end of July the temperature was practically normal and the patient could sit up and read, or go into the garden on a couch.

The hernia did not increase in size after the first two weeks. It was first dressed with compresses of rectified spirit, and later with a 2 per cent. formalin lotion. The hernia became covered with a hard brown crust; on removal of this protective crusty covering

one could see the actual brain substance, which pulsated; and the hernia seemed to increase slightly in size.

Since October the boy had been running about the wards quite happily, and was apparently in the best of health. Since November the temperature had been normal and the crusty covering had not been touched. The head was protected by an aluminium shield. The membrana tympani and middle ear were normal. The hearing was also normal. The hernia at first varied in size from time to time, but was now stationary. The case was brought forward to elicit expressions of opinions as to the desirability of further treatment.

Dr. Milligan said he believed the prognosis in the case was good if Mr. Tod would bring about replacement of the hernia. He believed those herniæ were granulomata, and that in such a case one should first reduce the intra-cranial pressure and then put on external pressure. He suggested that Mr. Tod should first of all do a lumbar puncture, and then put boracic fomentations over the hernia until it was cleaner, and then exert pressure over it by a sterilised sheet of lead or a sterilised sheet of copper, this being kept on for a considerable time. In the last year he had had two cases, but not so severe as the present one. One was the result of a cerebellar abscess, with probably acute inflammation of the cerebellum in the immediate neighbourhood. The other was an extensive extradural abscess, and in both cases the hernia was got back, one in three months and the other in one month. Another method was to remove still more bone around the existing hernia.

Mr. C. H. Fagge thought a cerebral or cerebellar hernia was always the result of some local inflammatory condition. He believed that in the present case it would be found there was a small collection of pus, some septic granulations, or a small necrotic area of bone, either of which conditions would give rise to a local œdema and a resulting hernia. He would suggest that the scabs be got rid of by fomentations, and that then the tumour be explored, if necessary, by the removal of bone around the present opening. He did not think lumbar puncture, which he understood Mr. Tod thought of carrying out, would be of any value.

Mr. Waggett said he had had one experience of this condition, which differed from that of both the last speakers. It was a hernia cerebri projecting into a mastoid wound, and which followed the removal of dura mater, infiltrated with pus. It was about the size of half a walnut. He was able to reduce it in the course of a few

weeks by simple pressure with packing. The fact that the hernia was reduced and that the patient recovered without symptoms proved that there was no collection of pus, and that there was no condition resembling a specific granuloma.

Mr. Richard Lake said he had seen two cases; in one the frontal eminence was taken off by a sword-cut, and a portion of brain about the size of half a hen's egg protruded. He was much astonished when the surgeon proceeded to slice it off with a knife. But the result was so excellent that he (Mr. Lake) had not hesitated to do the same, and his result also was good. He did not see the use of putting back a mass of cicatricial tissue which would be of little service.

Dr. Jobson Horne suggested that the aperture in the bone—but not that in the dura mater—be enlarged, that the possibility of a secondary collection of matter be looked for and excluded, and that pressure subsequently be applied.

Mr. Hunter Tod, in reply, said the hernia had been practically the same since the end of October. The hernia resulted at the time of operation; it did not come on gradually afterwards. The substance of the cerebellum and cerebrum was red and almost fluid. The treatment applied was first of all spirit, and then 2 per cent. formalin. In answer to Mr. Fagge, Mr. Tod said that there had been no treatment during the last four months, and during this period the boy had been absolutely well and had a normal temperature, which negatived the idea of the presence of an abscess. With regard to Dr. Milligan's suggestion, he had thought of doing lumbar puncture, and there were cases in which it had been of great benefit. But when one tried pressure, in the first instance, the boy suffered from intense headache and had almost an epileptiform seizure, therefore pressure was discontinued.

Drawing of a Traumatic Perforation of the Tympanic Membrane.

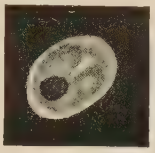
By H. Macnaughton-Jones.

Dr. Macnaughton-Jones said he brought forward this case of traumatic perforation because it was interesting from three points of view: first, the size of the perforation, which was exceptionally large, as following from a blow on the ear; secondly, the slight nature of the injury, as the patient, who was a medical man, was playing with his child at the time that the injury was inflicted by a blow from the child's open hand on the ear; thirdly, from the

little effect on the hearing caused by the perforation, and the complete healing up of the opening. As was common in these cases, there had been but little pain.

Particulars of hearing when the drawing was taken.—Whisper, 8 feet; *tuning fork,* 512 C = R, + 7 seconds; *watch,* 8/100; *Edelmann-Galton's whistle,* 30,000 vibrations per second. *Tuning fork,* loudest in affected ear opened and closed.

The treatment mainly consisted of stimulating applications of



nitrate of silver solution, which was carried out by the patient himself.

Dr. Jobson Horne remarked that it was an unusual form of perforation of the drum to result solely from an injury such as had been described, and it would be interesting to learn whether there had been any ear disease prior to the injury. In his experience of cases of perforation or rupture of the membrane resulting from an injury, such as occurred in this case, the hearing had not been materially impaired.

Dr. Edward Law said that possibly a blow from a child's hand might rupture the normal tympanic membrane in an adult, but was it not more probable that the doctor suffered from a perforation in early life, and that a thin cicatrix resulted, and so easily ruptured?

Dr. Pritchard had experience of three cases illustrating the amount of hearing left. A gentleman fell down while out shooting, and a straw went through his membrana tympani, but to all intents and purposes he heard normally on that side. In another case a gentleman put the end of spectacles through his membrane; here, again, there was practically no loss of hearing; but in the third case, where a child poked a pencil into the ears, first on one side and then on the other, of another little child, one ear was rendered stone deaf, and on the other side there was considerable labyrinthine deafness, besides which the injury set up acute mastoid disease.

Mr. Yearsley said that, as a rule, in rupture of membrane, unless it was done by direct traumatism, such as pushing a pin

through it, there had been some previous disease of that structure. He had seen fifteen cases of injury of membrana tympani, and his experience was that the deafness depended on the force of the blow and the amount of the labyrinthine concussion caused thereby.

Dr. Macnaughton-Jones, in reply, said the patient was a medical man, who had acute hearing up to the time of the blow. He had known the hearing most seriously interfered with in traumatic injury to the membrane, especially in those cases where there had been some effusion as the result of the blow, and where there was not so much a perforation as a rent in the membrane. In the case of a policeman who had a blow with the hand, the only thing perceptible was a rent in the membrane, and he became stone deaf. Hearing was perfectly restored after a time. In that case he thought the deafness was caused by the effusion, and possibly the labyrinth was involved at the time.

TWENTIETH ORDINARY MEETING.

Monday, March 6th, 1905.

THE VICE-PRESIDENT, MR. A. E. CUMBERBATCH, IN THE CHAIR.

The following gentleman was elected an ordinary member of the Society:

ARTHUR JAFFRAY HUTCHISON, M.B., C.M.Glas.

The following communications were made:

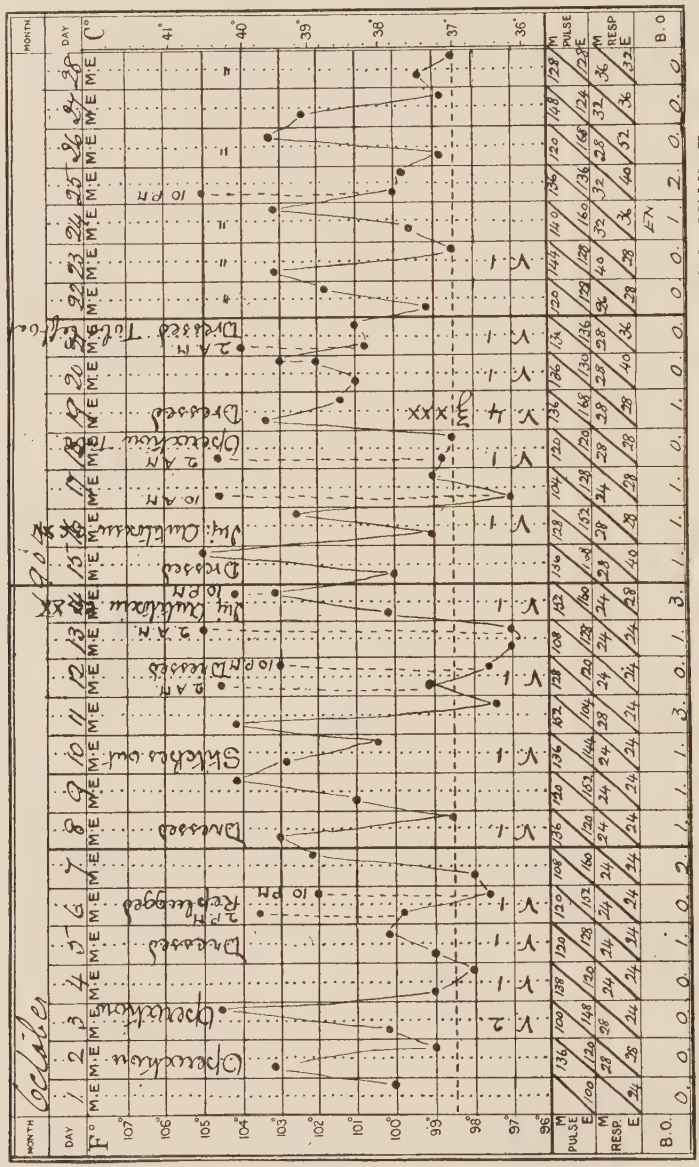
A CASE OF CEREBELLAR ABSCESS FOLLOWING ACUTE DISEASE OF THE MIDDLE EAR.

BY WILLIAM C. BULL.

A boy, aged eight, was admitted into St. George's Hospital on October 1, 1904. Three weeks previously he was seized with acute pain in the right ear. This was followed by purulent otorrhœa. Vomiting began fourteen days previous to admission and occurred once daily, generally in the early morning. He had been drowsy, and this symptom had increased lately. He frequently screamed and complained of pain behind the ear.

On admission he was conscious. Face flushed. There was slight non-offensive thin discharge from the ear, and a perforation of the membrane. No granulations could be seen. Deep pressure over the posterior part of the mastoid process gave rise to severe pain. Temperature 100°. Pulse 136. No optic neuritis and no nystagmus. Reflexes normal. He passed a restless night, and the temperature rose to 103° next morning. Respirations 28. Pulse 120. A curved incision was made behind the pinna, and the mastoid cells were opened. No pus was found in either the antrum or cells, which were apparently healthy. The sinus was then exposed, and about half a drachm of pus was let out. This was lying on the sinus. An aspirating needle was passed into the sinus and fluid blood drawn off. There was no thrombosis. The wound was left open and packed with gauze. The boy passed a quiet night, and next morning the temperature was 99°. Towards evening the boy

felt cold and was inclined to shiver. The temperature rose to 104·6°, and the pulse to 148. Anæsthesia having been produced, the internal jugular vein was tied in the neck and the sinus laid



Temperature Chart of the Case of Cerebellar Abscess following Acute Disease of the Middle Ear.

open. There was free hæmorrhage and no evidence of thrombosis. The sinus having been plugged, the dura mater directly behind was seen to bulge and was incised. No pus could be detected, but

softened broken-down brain matter escaped from the incision. The wound was drained. For a few days the boy went on well, though the evening temperature remained high. Vomiting continued once daily. He now complained of pain in the right side of the chest, and there was an increase of dulness in the right axillary region. Dr. Rolleston explored the pleura by aspiration in the fifth interspace in the posterior axillary line with negative results. The temperature remained very high, rising to between 104° and 105° every evening. On October 14, 20 c.c. of antistreptococcic serum were injected and this was repeated two days later. On October 18, as no improvement followed, the boy was again anæsthetised, and the wound explored. A small hernia cerebelli had formed, and on removing this an abscess containing about two drachms of pus was found in the cerebellum. This was drained. The otorrhœa had ceased, and the perforation had healed. Vomiting continued once daily till October 23, and then ceased permanently. The drainage-tube was removed on October 24, as no pus was escaping. Five days later the temperature fell to normal. A small hernia of the cerebellum formed and for three weeks there was a free escape of cerebro-spinal fluid. This gradually ceased as the hernia shrivelled up. Two months after admission the wound was soundly healed, and the boy in good health, with excellent hearing.

It is probable that in this case we had to deal with an early state of acute suppurative inflammation of the cerebellum. Infection, starting in the ear, passed through the mastoid cells and involved the brain. We are all familiar with chronic abscess consecutive to long-standing disease of the middle ear, but cases of acute infection are more rare. There was nothing to indicate involvement of the cerebellum at the time of admission. The symptoms rather pointed to implication of the sigmoid sinus. The diagnosis was rendered difficult by the absence of the symptoms usually met with in cerebellar affections. There are two points on which I should be glad if the members of the Society would give me their opinion. (1) Was it right when the temperature rose to 104·8°, and the boy was inclined to shiver, to tie the jugular vein and obliterate the sinus, notwithstanding the fact that it was fairly certain that there was no thrombosis? (2) If antistreptococcic serum be used, how often and in what doses should it be given?

My personal experience of the benefit derived from this treatment is most disappointing. Can any rules be laid down for future guidance on this point?

Dr. Urban Pritchard understood Mr. Bull to say he opened the lateral sinus, no doubt meaning the groove of that sinus. With regard to tying the jugular vein, Dr. Pritchard said it must be remembered that there might be a partial clot adherent to the wall of the lateral sinus which might be producing mischief in the lungs which could not be detected by external examination, and therefore one should be inclined to tie the jugular vein once too often than too seldom.

Mr. Arthur Cheatle asked whether the lateral sinus was likely to have been affected by the exploratory methods adopted by Mr. Bull. It should be remembered that the high temperature and shivering did not come on until after the sinus had been explored. He would be glad to hear what was the exact infection present, both in view of the rapid spread of the disease and of the question of the use of antistreptococcus serum: as it would be of no use to employ that serum unless it was a streptococcal infection. He did not think it was necessary to tie the jugular vein in the early cases; the sinus could be so easily opened and obliterated.

Mr. C. H. Fagge suggested that it was wrong to have tied the jugular vein. He thought that where there was the possibility of a parietal thrombosis or slight infection of the lateral sinus the best treatment to adopt would be to open the sinus and plug it first, deciding by what was found in doing this whether the jugular vein should be tied afterwards. He had in this way opened the sinus about ten times, and he had a case in hospital in which, after the complete mastoid operation, the temperature rose and there was a rigor. He opened the lateral sinus, left the plug in for four days, after which it was found to be closed. The patient's temperature came down twelve hours after the operation, and she got quite well. If a large enough opening was made into the sinus it was the easiest thing in the world to plug, and he could not see the object of going down in the neck and plugging one door to general pyæmic infection when there were half a dozen other doors open, and when the primary focus had not been actively dealt with.

Mr. Cheatle explained that he meant to open the sinus and clear it out, and then plug it.

Mr. Hugh Jones said he was at one time strongly of the opinion which Mr. Fagge had expressed, but he was gradually coming round to the feeling that one could not tie the internal jugular vein too often for such conditions where either the sigmoid sinus or the bulb of the jugular vein was affected. He would not say any

more then, as two of the cases he had on the agenda were such as required the tying and dividing of the vein and washing through.

Mr. Hunter Tod agreed with Mr. Hugh Jones and Mr. Bull as to tying the jugular vein early rather than leaving it. He had recently had several such cases, and he became more and more convinced that it was better to tie the jugular vein too early than to leave it for too long. Where there was complete thrombosis of the lateral sinus it was easy enough to open the sinus and let out the pus when there was more or less normal clot on each side, and this perhaps might safely be done without tying the jugular vein. Incising of the lateral sinus to see if it contained fluid blood was of no diagnostic value whatever. A small clot remaining in the bulb of the jugular might be ignored, and afterwards produce a general infection, at which period, after the lungs had become infected, it was generally useless to tie the jugular. He had a case of that description in which he did the text-book operation, when he removed the clot and plugged the sinus. The next day the patient had a rigor and infarcts in the lungs, and was so bad that he could not stand an anæsthetic. When he died the question was asked why the lateral sinus had been opened, as it appeared normal. The very fact of opening and clearing out the clot in the sinus had allowed a tiny fragment of the clot to escape into the general circulation. In this case tying of the jugular next day would have been of no use. He had also had other cases in which on opening the lateral sinus it was apparently normal, and where he had to tie the jugular next day owing to a rigor, and where on *post-mortem* examination only thrombosis of the bulb could be found. He advocated early tying of the jugular vein, especially when there were granulations arising from the floor of the middle ear. It was better to tie the main channel and risk the smaller paths than to say that because there were six or more possible pathways of infection they should all be left open: that argument seemed to be a very poor one.

Mr. Fagge said he feared he had been misunderstood. The primary procedure was to lay open the sinus, and after that was done and the operator had made up his mind what was the local condition, the jugular vein could be tied if necessary. But the sinus should first be opened freely; a little pin-prick was of no use whatever. All the cases which Mr. Tod had spoken of were chronic, whereas Mr. Bull's case which was now under discussion was acute.

Mr. A. Whitehead agreed with Mr. Fagge that the first procedure should be to clear out and obliterate the lateral sinus, and

in the majority of cases that would be ample; but if it was necessary to do anything further it was necessary to do more than tie the jugular; it should be excised.

Mr. C. E. West said that in a case which was recently under his notice, in which there was otitis media with streptococcus infection, the patient was intensely ill on the third day and looked like typical septicæmia. There was leucocytosis 38,000. Nothing was grown from the blood. She was given 70 c.c. antistreptococcic serum in twelve hours, and the next twenty-four hours she had 80 c.c. more. Within twenty-four hours of starting those injections her temperature was nearly normal, and she recovered without further symptoms.

Mr. Bull, in reply, thanked those who had spoken. He congratulated those who gave such heroic doses of antistreptococcic serum, but he was rather nervous about giving such large doses, and he would have been glad to hear how often and in what doses it should be given. He had had no good result from it up to the present. If Mr. Cheatle and Mr. Fagge would allow him to say so, he thought that in an acute case of infection from the middle ear, when after operation the temperature rose to 105° F. and the patient had a rigor, he would tie the jugular in the neck first.

Sketch and Notes of a Case of Emphysema (?) of the Membrana Tympani.

By Arthur Whitehead.

The patient, a middle-aged woman, had noticed some deafness on the left side one month, following a naso-pharyngitis of six weeks' duration. Hearing for watch: right, normal; left, $\frac{20}{36}$ inch. The left membrane was indrawn, but not congested. After catheterisation the posterior segment became covered with small vesicles containing air; these were unaltered by compression of the air in the meatus by Siegle's speculum, and appeared the same one hour later. Hearing normal after inflation. There had been no return of the deafness.

The Chairman said that such a case was altogether outside his experience. He had seen blebs containing fluid, but had never come across a case like that described, and it was difficult to explain how the air got there. It was difficult to understand how a rupture of the membrane should not have broken the epidermis, and should have merely separated it into that vesicular condition.

Mr. Yearsley asked whether it was not possible that those vesicles were small bubbles of air due to the frothing up of fluid inside the tympanum and seen through the membrane. He had seen such cases, and they looked very much like that represented in the sketch.

Mr. Whitehead, in reply, said he had no doubt that they were on the surface of the drum, and not internal to it.

Angeiolipoma (?) of Right Auricle and Meatus.

By Macleod Yearsley.

The patient, a child aged ten, had been the subject of the growth since birth. It was a soft, lobulated, sessile mass, entirely filling the right concha and apparently involving the meatus to within a short distance of the membrane. The colour varied from pink to purplish red. The right auricle was slightly larger than the left, the cartilage of the concha was much atrophied, and there were several telangeiectatic spots in the skin behind and below. The patient had also a dentigerous cyst in the right mandible. Mr. Yearsley had been informed by Dr. Seligmann, the pathologist to the Zoological Society, that he had observed somewhat similar growths in the auricles of fox-terrier bitches, but in these the lipomatous element preponderated over the nævoid tissue. It would be interesting to know whether such a growth arose from some persistence of the arterial supply of the first visceral cleft. Mr. Yearsley specially asked for advice as to the best method of treating the case, whether to try electrolysis or to attempt excision, and which of these two methods would give the least disfigurement.

Dr. W. Milligan thought that if the diagnosis were correct electroylsis would not be sufficient. One might in that way get rid of the angeiomatous condition, but not of the lipomatous condition. He was not certain from feeling it how the diagnosis of lipoma was arrived at. A few years ago he had a similar case in a child which was angeiomatous, and he tried electrolysis, but it had failed. Then he dissected it completely off the auricle, with satisfactory results. In this case he thought that the growth should be completely removed by the knife.

Mr. L. A. Lawrence thought it was more a nævoid condition than anything else, more particularly looking at the surrounding parts, and that the simplest thing would be a needle operation on

one of the smaller growths. If that were successful the larger ones could be treated in the same way. The patient being a girl, she could always dress her hair to hide the deformity.

Mr. Fagge said he had treated many such angeiomatous growths in different parts of the body in children, at the Evelina Hospital. At first he tried, in accordance with the advice in the text-books, to get rid of them by electrolysis, but when of large size and deeply situated, as in the present case, complete removal by this method was impossible. The only method was to remove them freely with the knife.

Dr. Wyatt Wingrave was inclined to consider it as a cholesteatomatous cyst rather than a lipoma, a view which was supported by its site, by the localised disappearance of the cartilage, and the presence of neighbouring cysts. Lipoma he generally found associated with the lobule and accessory tragi.

Dr. Macnaughton-Jones thought the condition was not lipoma. It was difficult to say how much angeiomatous tissue was present, but his idea was that it was nævoid. He would have no hesitation in removing it, in which step he did not see any particular risk.

Mr. Yearsley said his diagnosis was preceded by a query to show that it was only a provisional one. He looked upon it as chiefly nævoid, with fatty degeneration. One of the reasons he put angeiolipoma instead of being more explicit was because of what Dr. Seligmann had told him about similar tumours in the lower animals. He was not inclined to try electrolysis, and was glad to hear the advice to excise. He desired to get the best result with the least disfigurement.

Case of Removal of Part of the Cochlea, External Wall of the Vestibule, and of the External Semicircular Canal for Relief of Tinnitus and Vertigo.

By Richard Lake.

The case which I now bring before the Society is one which everyone will agree presents a good many points of interest. It is that of a girl, aged twenty-six, who was sent to me by Dr. Pegler in March, 1904, to see if I could afford her any relief from tinnitus of a very depressing character, which prevented proper sleep. The vertigo was accompanied by a tendency to fall forward.

She was unable to appreciate even shouted words with either ear. The results of testing the hearing were briefly : *Weber*, L +, *Acoumeter, Voice, Whisper*, R. and L. nil; *Rinne C.*, R. and L.

negative; *Rinne* C^2, R. and L. negative; *C. Mastoid*, R. and L.—25″; *Air Conduction*: 3C 16, 2C 32, 1C 64, R. and L. nil; C 128, C^1 256, C^2 512, R. nil, in concha and only when struck very loud; C^3 1024, C^4 2048, L. nil.

She informed me that the deafness and tinnitus had been very severe for seven years, and further that she had had an operation performed at the London Hospital by Mr. Tod, which was apparently mobilisation or removal of the stapes. This, however, appeared to have been without any effect. This operation was done on the right side, which was the side on which the tinnitus was most severe, that on the left being quite slight. She suffered very slightly with vertigo, or at any rate this was not at all a prominent symptom.

As she had already been subjected to the approved methods of treatment by means of drugs, etc., I suggested to her that an attempt should be made, by opening the cochlea, to give her relief. To this she willingly assented, and on April 4th, 1904, she was anæsthetised, and a complete post-aural operation performed in such a way as to expose completely the inner wall of the middle ear. The outer wall of the fenestra rotunda was removed up to the cochlea, leaving the vestibule intact. The outer wall of the cochlea was next attacked with a small burr, and the lower portion of the cochlea was opened. Whether there was any fluid in the cochlea or not it is difficult to say, but I observed none. Just at that time I had the misfortune to have a side slip with the burr, and tore completely through the facial nerve, just where it makes the angle before passing backwards, thus completely marring an operation which so far seemed likely to be satisfactory, and this accident distressed me very much.

The patient quickly recovered from the effects of the operation itself, and for the space of two weeks had no tinnitus whatever. At this time she was transferred from the Royal Ear Hospital to the Italian, under the care of Mr. G. L. Cheatle, who had previously been a member of our staff. There, after an extremely difficult dissection, the distal end of the severed facial nerve was attached to the proximal end of the hypo-glossal, with, as you have seen, a remarkably successful result.

For the next month she suffered considerably with pain in the scar behind the ear. The tinnitus was as distressing as ever, and the attacks of vertigo gradually increased in severity. She came into the hospital again, most anxious that another attempt should be made to relieve her.

On January 2 of this year the post-aural incision was reopened and the whole cavity was found largely filled with a dense fibrous tissue. This was carefully removed, and the external semicircular canal exposed in almost its whole length. In this, as well as in all subsequent stages of the operation, a small curved gouge was employed, as the electro-motor had broken down just previously to the commencement of the operation. The external canal was cut off by means of a chisel in practically one piece, making a fair-sized opening into the vestibule anteriorly. The whole of the external wall of this cavity was now removed, and the base of the stapes was found to be firmly ankylosed to the edge of the oval niche. With a little gouge I worked as far as possible towards the ampullæ. The middle fossa came down very low, the bone between the dura and upper surface of external semicircular canal being about 4 mm. Attention was then directed to the cochlea, and on removing some more fibrous tissue, which was filling up the anterior part of the cavity, and which up to this time had not been interfered with, the original wound in the cochlea was disclosed, apparently in much the same condition as after the first operation; that is to say, there was apparently no new bone formation in this region. The cochlea was then opened as much as possible, certainly up to the second portion. In working deep to the modiolus, the thin partition separating the lower portion of the cochlea and this part from the internal auditory meatus was broken through. This opening was further enlarged, and as much of the nerve destroyed as possible, though this was rendered difficult by the profuse discharge of cerebro-spinal fluid.

The post-auricular wound was closed up immediately, and the case treated in the ordinary way. The post-operative state of the patient was only interesting on account of the total absence of all those symptoms which the experience of Dr. Milligan and myself would have led us to anticipate; that is to say, that there was no jactitation of the eyes and an entire absence of vertigo. The patient was able to stand up, turn round either way with her eyes shut, and pick up an object from the floor on the fifth day after the operation. A very slight amount of tinnitus recurred again on the fourteenth day. This, however, is so slight as to cause her no inconvenience whatever, and must have been due to some filaments of the cochlear division of the eighth nerve having escaped destruction.

The case and its results must have, I think, an important bearing on what we have considered up to now to be the correct

physiology of the semicircular canals, and bear out a previous contention of mine, that it is irritation of the ampullar nerves that causes vertigo, whilst complete destruction causes none; though the explanation of the entire absence of any interference, as far as one is able to judge, with co-ordination seems less clear, unless a similar theory can be applied to this also.

Besides these remarks, I trust I may be excused for briefly recalling to your minds what has so far been attempted with regard to the relief of tinnitus. Wallis divided the auditory nerve without relief. Parry had an equally negative result from this operation, for in his case neither the vertigo nor the tinnitus were influenced. Since then Armour has, I learn, not only divided the nerve successfully, but has obtained an equally successful result, and without injuring the facial, as occurred certainly in more than one of the other cases.

The Chairman said Mr. Lake's remarks were rather upsetting to one's belief as to the effects of irritation of the semicircular canals in regard to vertigo. With regard to the tinnitus which still remains, one must take it that it had now, through long continuance, become central, and could thus easily be explained without supposing that any of the nerve-filaments had escaped.

Dr. Gray said with regard to the physiology of the semicircular canals he thought the absence of vertigo at the second operation might possibly be explained by the first operation, which might well have destroyed the epithelium, and that might account for the absence of vertigo. With regard to the effect of the operation upon the muscular tonus, Ewald of Strassburg had put forth a theory that the function of the semicircular canals was to produce tonus in the muscular system of the body. It would be interesting to find out what was the woman's faculty for the rotation sense over a long distance. Dr. Gray pointed out that people who had had their semicircular canals destroyed are said to have rather a low sense of rotation. Another authority had pointed out that congenital deaf mutes have a diminished sense of rotation also. He believed sea-sickness was owing to disturbance in the canals, but in such a case there was no sensation of objects rotating in one plane, since the stimulus was not the result of pressure from one constant direction in the canals.

Mr. C. E. West remarked that in a conversation with Mr. Lake he was much struck with the fact that that gentleman's experience coincided with his own with regard to treatment of the labyrinth.

Total extirpation of the semicircular canals, with opening of the vestibule from above, was followed by intense vertigo which lasted some weeks and then slowly cleared up, leaving the patient absolutely free, so that she could now stoop and pick up a small object from the floor without hesitation. But when the vestibule was also opened up from below by opening up the first turn of the cochlea and fenestræ and curetting the interior so as to destroy all the nerve-endings, though there was some vertigo, it was not severe, and complaint was only made when questions were asked about it. The second patient had no vertigo, but she had muscular incoordination. She did things perfectly with her hands, but on walking she swayed badly from side to side. He could add three cases of semicircular canal operations, and hoped at some time to bring them before the Society. It was disappointing that the present patient had practically no hearing before the operation, as he wanted to learn whether a partial removal of the cochlea of a patient necessarily resulted in total deafness on that side; he believed not.

Mr. Fagge asked what was the original nature of the disease. He did not gather why in this case the suture of the hypoglossal and facial nerves was so difficult, and he thought that the suggestion that any procedure was of extreme difficulty was inadvisable in that it prevented the performance of what was a most valuable operation. He (Mr. Fagge) had only done it twice, and it was much more easy than he expected to find it. He asked whether it was the experience of members that after facial and hypoglossal anastomosis the muscles about the eye entirely recovered, but those about the mouth did not. In the better of his two cases, a little girl of ten years of age whose facial nerve had been divided, after suture to the hypoglossal, the movements of the forehead and eyelids were absolutely normal, and that was most important, because the reflex blinking movements of the eyelid were much more noticeable than were the voluntary movements of the mouth. Possibly for some reason which was not known, the innervations of the muscles about the eyelid were less vulnerable than those about the mouth.

Mr. Hunter Tod said that the case had been under his care at the London Hospital three years ago, and was sent by a doctor because of vertigo and tinnitus. She was very deaf, and he did not want to do anything at all. But the friends insisted, and, seeing there were post-suppurative adhesions and that it was not an ordinary dry middle-ear catarrh, he thought removal of the malleus

and incus might benefit her. He did that operation in the worst ear, but since then she had been no better at all. He asked in what class of case Mr. Lake did the operation, and whether he only did it when there was marked deafness, or would it be justifiable where there was considerable hearing?

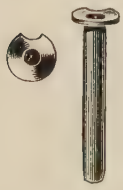
Dr. Logan Turner, referring to Mr. Fagge's question about the innervation of the muscles about the eye compared with those about the mouth, thought the explanation would be found in connection with the third nucleus.

Mr. Lake, in reply, thought the absence of vertigo after the second operation could not have been due to the want of vestibular fluid, because the vertigo became worse after the first operation was done. Mr. West pointed out a fact which he (Mr. Lake) had forgotten to consider, namely, that conditions had been altered by reason of his having broken up the vestibular nerve after getting into the internal auditory meatus. It was a particularly difficult dissection, because there had been suppuration in the neck, leaving an enormous amount of scar tissue. As to how and when such operations should be done, he thought that depended on the view which the patient took of her own condition. If only the canals were to be removed, it need not always injure the hearing, but if the cochlea were destroyed wholly or in part there would be no further chance of hearing.

Case of Atresia of the Meatus.

By H. Macnaughton-Jones.

Dr. Macnaughton-Jones said the case had led to a discussion when shown in May, 1900. He might remind the members that the atresia of the canal was originally, in part, of an osseous nature and that the lumen of the meatus was occluded up to the entrance. The hearing then (three years after operation) was not so good as it is now; the watch was heard on contact only, now the same watch was heard at five inches, and a whisper at some three feet. The tube gave practically little trouble and all discharge had ceased for some years. The interesting feature in the history since the patient was last shown was, that in 1901 the other meatus had been also closed by a thick membranous partition which formed at a short distance from the tympanic cavity. This had developed without pain. Dr. Law had seen the case at this time. Deafness of the ear was the only symptom, and for this



she had again come for advice. He (Dr. Macnaughton-Jones) had excised the occluding partition and used the galvano-cautery to secure patency. The aperture which remained, although not large, had kept open and she now heard well with this ear, the watch at about a foot and a whisper at several feet.

Dr. William Milligan thought Dr. Macnaughton-Jones was to be heartily congratulated on his patience in the treatment of his patient. He remembered the discussion in 1900, in which it was declared by some that radical operation for the patient was essential. The result now was admirable, for the patient heard at a distance even slightly whispered conversations. He asked whether the patient had gone without the tube for any prolonged period, because it would be interesting to know whether the power of contraction of the fibrous tissue of the meatus was still present. His own experience was that the contractile power of that tissue was so great that it practically doomed the patient to wearing a tube all the rest of his or her life unless some such radical operation as removing a portion of the posterior wall of the bony meatus was performed.

Dr. Macnaughton-Jones, in reply, said he had not taken the tube out because it had given no trouble and he did not care to run the risk of further contraction. That seemed to be the main danger, that there might be contraction of the lumen.

Neoplasm of Auricle (Fibroma ?).

By Wyatt Wingrave.

The patient, a female, aged twenty-four, had the ears pierced ten years ago. Normal healing followed and nothing amiss was observed until twelve months ago, when she noticed a small, hard substance like a pea, which interfered somewhat with the adjustment of her ear-ring. As the mass grew larger the hole became obliterated and she ceased wearing her earring at the end of the fourth month.

The growth is solid, opaque, firm, and painless. It occupies the site of the ring perforation and is bilobed. The smaller lobe is in front, but is apparently continuous with the larger and posterior portion. There is no history of any local irritation beyond the wearing of an ornament.

Dr. Pritchard said he had read about that condition, but seen very little of it. It sometimes happened that one man saw several examples of a condition, while another man in a long experience

Photographs of a case of Fibroma of the Auricle.

had seen none or very few. He would be glad to hear whether any other members had seen similar cases of fibroma.

Mr. Yearsley said he had had a similar case in 1898, in a girl aged seventeen. There was a fibroma on each lobule, probably arising at the site of an ear-ring perforation, and obliterating the puncture. He removed them both, and as far as he knew they had not recurred. Microscopically they were found to be simple fibromata.

Dr. W. Milligan said that in the Manchester Ear Hospital there had been rather a remarkable series of such cases—cases of torn lobule, keloid, and fibroma, probably as the result of the irritation of ear-rings. When trade was good factory hands bought cheap and bad jewellery. He had heard that the condition was quite common in negro races, in whom not only did the ear-rings worn cause fibroma, but also caused elongation of the lobules, so that in cold weather the lobules were used as face protectors.

Mr. Hugh Jones said he saw one such case six months ago.

Mr. L. A. Lawrence thought the condition was keloid, and he had seen a growth like it on the face.

Malformation of Auricle in an Infant aged three months.

By Wyatt Wingrave.

The right auricle is rudimentary, being represented by soft tissue, indicating helix, tragus, antitragus, and lobule. There is not even a dimple to indicate the site of a meatus. The auricle is freely movable on the subjacent structures, and neither cartilaginous meatus nor tympanic ring can be felt. Evidence of audition is unreliable.

With regard to the left ear, there is considerable stenosis of the meatus at a depth of about three quarters of an inch. A probe can, however, be passed to a depth of an inch and a half. This auricle is normal, and the mother thinks that the infant can hear with this ear.

The condition of the right ear, especially the absence of the tympanic ring, indicates incompletion of the hyomandibular cleft.

A Membranous Septum in the Interior of the Lateral Sinus.

By Arthur Cheatle.

The left temporal bone of a man aged forty. In the descending portion of the lateral sinus is a septum half an inch in length,

running in the axis of the vessel, thus forming a double channel. Dr. Arthur Keith states that a septum within the lateral sinus is new to him, but that septa occur in the superior longitudinal sinus.

The Chair was taken at this point by Dr. Urban Pritchard.

Three Temporal Bones from Cases of Chronic Middle-Ear Suppuration.

By Logan Turner.

(*a*) Right bone from young child. Death from general meningitis and temporo-sphenoidal abscess. Specimen showed necrosis of outer table, caries and perforation of tegmen antri. perforation of dura matter of middle fossa.

(*b*) Right bone, adult. Showed perforation of posterior wall of external osseous meatus.

(*c*) Left bone, adult. Death from peri-sinus abscess, general septicæmia. Showed unusual position of sigmoid groove, which reached as far forwards as posterior wall of osseous meatus.

Case of Mastoid Fistula for Opinion as to Treatment.

By Hunter Tod.

The patient, a girl, aged ten, had a complete mastoid operation performed on the left side two years ago by another surgeon. The old notes stated that "a small flap of skin was tucked into the wound in order to draw the ear back." A fistula now existed behind the ear, through which sprouted a bunch of hair. There was a large hole in the concha simulating the external meatus, similarly filled by a tuft of hair. The true external meatus was much stenosed. There was still slight otorrhœa.

Mr. A. Whitehead said the most interesting point in the case was that there still remained some slight otorrhœa. If there were no otorrhœa there would be no reason to interfere with it, but when there was a discharge, no doubt containing septic organisms, something should be done, and if necessary the complete mastoid operation.

Mr. Fagge thought the stenosed condition of the meatus, with the otorrhœa, were the most unsatisfactory features of the case. He thought it would be easy to extirpate the cavity in which the

hair was growing by a complete mastoid operation followed by skin-grafting, which in his opinion the stenosis and persistent otorrhœa necessitated.

Mr. Yearsley agreed that the radical mastoid operation was distinctly indicated.

Dr. Milligan thought the decision as to what should be done rested on whether there was bone disease or not. He understood there was slight otorrhœa when Mr. Tod first saw the case, but there was none now. If so, it was probably some temporary condition, and there was no need for a radical mastoid operation. He did not know what was the condition of the middle ear. If there was only superficial inflammation of the mucous membrane he would leave the case alone; it would be unsatisfactory whatever operation was done, and unless there was some more urgent reason present for operation than appeared at the moment his advice would be to do nothing whatever.

Dr. Dundas Grant thought operation in that case was justifiable, and after the part had been opened and the auricle turned forwards from behind, an opinion could be formed as to whether a more radical operation was required. From the cosmetic point of view considerable improvement might be effected. The wall of the meatus might be thrown back and stitched to what would necessarily be the postero-inferior margin of a very large external meatus in the concha. It would not be ideally perfect, but it would be better than the very unsightly condition at present existing. In any case the skin from which the hair was growing might be eradicated and replaced by a skin-graft.

Dr. Pritchard said he would reopen the parts, because it would be impossible to preserve an aseptic condition of things until that hair was removed. There could be no harm in opening it up and acting further according to what was found to be present. It seemed to be a good case for subsequent grafting.

Mr. Hunter Tod, in reply, said he brought the case forward because he thought it might be difficult to do a plastic operation. The child had had otorrhœa off and on, but the patient was brought really on account of the other ear. When he last saw the case, three weeks ago, there was otorrhœa, but there were no head symptoms. One could not get a good view of the ear, and he could feel no dead bone. He thought the otorrhœa might come from the lining membrane of the original external meatus. Therefore he agreed with Dr. Milligan that there was no apparent necessity for an immediate radical operation. If, however, the

otorrhœa continued, he would do the complete mastoid operation, and at the same time remove the hair-covered skin.

Notes of a Case of Otitis Media Hæmorrhagica in a Male Patient suffering from Granular Kidney and Diabetes.

By W. Milligan.

The patient was a male, aged fifty-two, who had suffered for two years from chronic Bright's disease, and for at least one year from diabetes. He had also suffered from headache and occasional vertigo. His arterial tension was high. Sudden deafness occurred upon his right side, without any pain but accompanied by a dull heavy feeling upon the same side, of the head. Examination showed the cavity of the right middle ear to be nearly full of a dark reddish-brown exudate. His hearing power was $\frac{3}{60}$ of the normal and upon the left side $\frac{10}{60}$. The tuning-fork tests showed impairment of both auditory nerves. Local treatment was used with the idea of assisting absorption of the effused blood. During the period of treatment the patient suddenly became partially blind upon the right side. Examination revealed a hæmorrhage into the retina, and extensive albuminuric retinitis.

The membrana tympani was eventually punctured, and the effused blood removed by suction and catheterisation. The incision healed rapidly, and so far as is known no further ear symptoms have appeared.

Mr. Whitehead asked whether the case was still under treatment, what became of the effusion, and what was the subsequent course of events.

Dr. Pritchard thought the condition described was much more common than was generally supposed. Of course when the condition occurred in the eye during chronic renal disease it was much more obvious, both to the practitioner and to the patient.

Dr. Dundas Grant thought the case came under a more interesting category than that of the typical otitis hæmorrhagica, in which there was generally intense general disturbance and inflammatory discharge, which from the density of the inflammation was accompanied by effusion of blood; but in the present case it was hæmorrhage into the tympanum, and might be called hæmato-tympanum. The case was all the more instructive on that account. Most of the members had seen cases in which sudden hæmorrhage had taken place into the internal ear, associated sometimes with albuminuric

retinitis; and probably at an early stage effusion into the tympanum occurred also which might get absorbed before it came under notice, although the labyrinthine disturbance persisted.

Dr. Milligan, in reply, agreed with Dr. Dundas Grant that it was not an inflammatory condition but an exudation, and the name he (Dr. Grant) suggested was probably a better description of the case than the one he himself had employed. In reply to Mr. Whitehead, he said that after trying local treatment without avail, he punctured the membrane and drew out some fluid, which he examined, and found red blood-cells. Hearing returned to some extent, but it probably was not very good in that ear before, although he had no evidence. There had been no return of hæmorrhage into the ear. The hæmorrhage into the eye was considerable. The general condition of the patient was unsatisfactory.

TWENTY-FIRST ORDINARY MEETING.

Monday, May 1st, 1905.

The President, Dr. Thomas Barr, in the Chair.

Discussion on Vertigo, its Pathology and Treatment.

The President said the knowledge of the relation of ear disease to vertigo, inaugurated by Ménière in 1861, had been a great gain, not only to otology, but to general medical science. Vertigo, both as related to the ear and in its wide aspect, was a subject well fitted for discussion at that Society; it was one, not only of interest to the otologist, but it was also of great interest to the general practitioner, to the physician, to the surgeon, and to the physiologist. The Society had reason to congratulate itself on having the co-operation that day of such distinguished representatives of surgery and medicine as Sir Victor Horsley and Dr. Risien Russell, and he thought he could safely predict that by the contributions of these gentlemen to the Society that afternoon the value of the discussion would be greatly enhanced.

Introductory Address by Sir Victor Horsley.

Dr. Barr and Gentlemen,—I am much obliged to you for the kind way in which you have introduced me, but I am above all obliged to the Society for the opportunity of taking part in the discussion on such a subject as vertigo, because, although it is an extremely large question, still I think at this juncture we are in a position to correlate the information at our disposal for purposes of diagnosis; and of course, having secured the diagnosis, the matter of treatment becomes relatively simple. In the first place, I intend to confine myself entirely to true rotation, to an actual sense of rotation on the part of the patient, or to actual rotation as a forced movement, and such rotation, as a rule, accompanied by nausea. I am not in any way presuming to trench upon the wide field of the

physician, namely, where we have rotation indistinguishable from dizziness. And further, I must admit a considerable limitation, because my experience is drawn practically from only two classes of patients, namely, cases of destructive ear disease on the one hand, and new growths on the other. I have seen, of course, a considerable amount of Ménière's disease that has been referred to me from time to time, but of such conditions as laryngeal vertigo I know nothing. Perhaps, however, this narrowing of the subject makes my part of the discussion rather easier. Now, in the first place, with regard to the severe vertigo, it is a sudden disturbance of equilibration, and what we want to know is whether this disturbance occurs in the periphery—that is to say, in the semicircular canals—and whether that disturbance in the periphery is produced by pressure in the middle ear upon the labyrinth, or by direct disease of the labyrinth. Then we want to know whether the mischief is not really in the trunk of the vestibular nerve, and then, again, whether it may not be in the bulb, whether it is in the cerebellum, whether it is in the pons, or in the crus, or finally, in the cortex and particularly that of the temporal lobe. Naturally I shall have to introduce into my remarks an allusion to the discussion of the question as to whether our faculty of orientation in space is represented in the cerebrum, and I am going to suggest that that representation lies principally in the temporal lobe. Thus far as regards the anatomical basis of this phenomenon of vertigo. Next, as regards the phenomenon itself, I desire to maintain the position that it is a physiological condition strictly analogous to the onset of an epileptic fit, or to the onset of an attack of trigeminal neuralgia. As I know only too well, from my own personal observation after an attack of influenza ten years ago, the onset is so absolutely sudden that it resembles an epileptic attack on the one hand and an attack of trigeminal neuralgia on the other very closely. It attacks you as though you had been seized with a giant force and hurled backwards. Such a sudden physiological disturbance of the central nervous system as that, it seems to me, can only be analogous to a condition of things in which you have a summation of stimuli. Therefore the onset of an attack of vertigo would seem to be as interesting a subject for discussion as the onset of an attack of cortical epilepsy, or any of the other fulminating acute nerve disturbances which we know of as possessing this similar sudden character. To begin with the peripheral mechanism, we are in this position now, that cases of semicircular canal disease require more attention in the direction

of localisation. In my own case I discovered it was easy for me to exclude those movements of the head which brought on the vertigo from those which I could practise with impunity, until at last it came to this: that I could move my head in any plane, horizontal, vertical, or oblique, except in the horizontal plane toward the right. Every time I turned it to the right there immediately ensued the sensation of being, as I say, hurled backwards. If we had a more minute localisation of peripheral disease, then we should have the groundwork of more correct localisation of central disease, to which I desire now to turn. In speaking of semicircular canal trouble and in referring to extensive middle-ear disease, I am well aware that if the whole labyrinth is affected it is difficult to get such localisation, but in cases like my own, where the condition was simply transitory congestion, I suggest it is an easy clinical task.

Proceeding now centralwards, we come to the trunk of the vestibular nerve; and here we enter upon perhaps a less complex part of the subject, because I am not aware that true vertigo has resulted from disease of the vestibular nerve except when that has occurred in the form of new growths. It is, of course, quite possible to imagine that in cases of extensive caries in the petrous we should have neuritis of the vestibular nerve, but in specimens like these of tumours of the eighth nerve (which I exhibit by the kindness of Dr. Farquhar Buzzard, pathologist to the National Hospital, Queen Square) the lesion is very definite. This growth, which I removed from a patient a short time ago, caused a forced rotation and sense of rotation which were extremely marked and strictly localised.

Passing next to the medulla itself, as Dr. Thomas Buzzard pointed out a long time ago, we are in great difficulty with regard to the exact localisation of disease of the eighth nerve and disease of the medulla itself, because in all these cases of eighth-nerve implication the region of the auditory striæ and the lateral recess of Luschka is the common situation of new growths. It is almost impossible, then, to differentiate between disease of the trunk of the nerve as it lies under the peduncle of the flocculus and disease of the cerebellar nuclei of Deiter's nucleus or the other vestibular nuclei. But in every case of disease of the vestibular nerve or its nuclei we have to consider two different things, both of which are disorders of equilibratory orientation, not only the true rotation which affords the only means of correct localisation, but also that disorder of equilibration which we call titubation. This is the first

FIG. 1.—View of the cerebellum to show the contrast between the vermis and lateral lobes. From Foville's 'Anatomie,' etc.

FIG. 2.—Encephalon of shot rabbit, No. 1, showing destruction of right paraflocculer and floccular lobe by a single pellet, which passed forwards through the outer surface of the right temporal "lobe," and severed most of the fibres of the right middle peduncle. The animal immediately exhibited rotation around the longitudinal axis, skew deviation, etc.

To illustrate Sir VICTOR HORSLEY'S paper on Vertigo.

stage in the equilibratory mechanism at which titubation comes in as a clinical symptom, and I desire to suggest that a lesion situated anywhere from this point to the temporal cortex may cause titubation. And I would also like to suggest at this point, for discussion in the localisation diagnosis, that we do not get true rotation from simply middle-ear trouble, meaning by true rotation, objective rotation, forced movement; we do not get such forced movement until the nerve structure, *i.e.* vestibular trunk or wall of the labyrinth, is implicated.

We come next to the cerebellum itself (Fig. 1), and here in the cerebellum we have two totally distinct organs. Of the two organs, one is the lateral lobe of the cerebellum, and the other the vermis or the median portion of the cerebellum. And whereas the vermis is concerned with rotation round a horizontal plane of the body, the lateral lobe is an organ which is concerned with the so-called circus movement, or *mouvement de manége*—that is to say, rotation round the vertical axis of the body, and often in a circle with a large radius. From either of these two organs or divisions of the cerebellum we may get the rotation of a vertigo, the localisation of which is comparatively precise. But we have still to consider the relation between the cerebellar part of the mechanism of equilibration and the cerebrum. As regards the lateral lobes of the cerebellum, they are not directly united with the cerebrum. They are connected by the middle peduncle with the pons. The pons is connected by means of the outer part of the crus with the temporal lobe directly by Türck's bundle.

I will now pass on to the pons, because the pons was the seat of the earliest experimental observations on the subject of vertigo by Majendie at the beginning of the last century, and lesion of the middle peduncle of the cerebellum was the principal object of Majendie's operations. The interest of his observations, apart from their striking originality, lies in the fact that they were done before the discovery of anæsthetics, that the phenomena he produced were immediate, and that consequently he had before him an exact parallelism with all that we observe clinically—that is to say, the sudden onset of the vertigo. It has always occurred to me in shooting to look out for cases of a lesion of the cerebellum and the immediate phenomena resulting therefrom. As rabbits are almost invariably shot while running away from the gun, single pellets not infrequently penetrate the cerebellum and cause remarkably localised lesions. The accompanying photographs are good examples of this, because they illustrate the phenomena as they occur in

the clinical manner. That is to say, the lesion is suddenly produced, and the immediately resulting phenomena are immediately observed. Fig. 2 is a case of a rabbit's brain in which a single pellet passed through the petrosal portion of the lateral lobe, and superficially through the tip of the temporal portion of the cerebral hemisphere. That animal immediately sprang into the air and exhibited the typical rotation fits around a longitudinal axis. On picking it up I found it had skew deviation, right eye directed downwards, contracted pupil, left eye directed upwards, with dilated pupil, and the limbs of the opposite side rigid—in fact, all the concurrent phenomena of lesion of the middle peduncle of the cerebellum. That was shown to be, in fact, the case by subsequent microscopical investigation.

The next is rather more striking in one sense, because it shows the forced movement of rotation, and not from any actual destruction, but simply from a bruising of the middle peduncle—*i. e.* the pons. This photograph (Fig. 3) is of the rabbit as it lay on the ground—of course, perfectly unconscious, but with the typical cerebellar attitude, the fore limbs in rigid extension, the head drawn strikingly to the right: the homolateral hind limb semi-flexed, the contra-lateral fully extended. The photograph does not show the skew deviation of the eyes. The next photograph (Fig. 4) is of the base of the animal's brain, whereby you see that no shot penetrated the brain, but that one pellet had fractured the petrous bone and had produced a little bruising (exaggerated in the photograph) of the middle peduncle of the cerebellum and slightly of the trapezium, especially where the fibres dip into the raphe. That animal, in addition to the forced attitude, also exhibited markedly the rotation movements and also circus movement.

In man, of course, it is extremely rare to observe as a direct result of objective injury, fracture, or otherwise, this incidence of vertigo, when evoked by a lesion of the middle peduncle of the cerebellum. Through the kindness of Dr. Alfred Price, of Bromley, I have seen such a case, which also presented the most interesting concurrent symptom of auditory amnesia, which I shall speak of directly. It was that of a boy who was flung off a see-saw, described a large circle, and landed on his head. He was picked up with the usual signs of concussion and was taken home. He vomited, and then in the evening began his rotation fits, in which there were strong forced movements of rotation to the left, with a sense of everything moving to the left. It was then discovered that although they spoke to the boy and he heard

FIG. 3.—Shot rabbit, No. 2. Single pellet fractured the right petrous bone and caused slight bruising of the right pontine nucleus and tract and trapezium. Note the curvature of the trunk concavity to the right, the head turned towards the right, and the right ear really approximated to the right shoulder, both fore limbs extended, homolateral hind limb flexed, contralateral extended. There was also present skew deviation of the eyes—right eye down and in, left up and out.

FIG. 4.—The brain of the rabbit, No. 2, shown in Fig. 3. The only lesion of the encephalon is the superficial bruising of the pons, and slightly of the trapezium (right half).

To illustrate Sir VICTOR HORSLEY's paper on Vertigo.

them well, he did not understand what was said to him. I need not go into that in greater detail except to mention also that he had a little transient hemianopsia. So it was clear that he had bruising of the middle peduncle of the cerebellum, with probably a bruising of Turck's bundle in the crus itself, the bruising extending up on to his optic tract and probably into the temporal lobe. As may be seen from an examination of the base of an adult human brain, such bruising would all easily be included within one square inch area.

This case, exhibiting as it does in an unusually clear manner the association of auditory amnesia, rotation, vertigo, hemianopsia, etc., raises for discussion the question of the representation of orientation and equilibration in the cerebrum, because, of course, for differential diagnosis we must have the whole tract which may be involved under view at the time of examining the patient. Hitherto most attention has been directed on the question of orientation in the cerebrum to the excito-motor or kinæsthetic part of the pallium, the ascending frontal gyrus, and it is to those centres for the movement of the upper and lower limbs and trunk, in the minds of most physiologists and clinicians, that the idea of orientation of the body in space has been ascribed. As was pointed out by Edinger, and two years ago by Dr. C. K. Mills, of Philadelphia, since the most direct anatomical connection that we know of definitely between the pons and the cortex is this part, the posterior two thirds, of the temporal lobe, we should regard that as the centre of orientation. It had long been established by Dejerine that this portion was in direct connection with the pons by Türck's bundle. This much was proved by the degeneration method, and from a large series of experiments, extending over a number of years, in cats and monkeys I have also obtained the same localisation. We ought, therefore, to find in cases of lesion of this part that the patients at least have that disturbance of equilibration which I referred to just now, namely, titubation. In support of this I should add that I have now two cases in Queen Square, patients who are up and about, who had had tumours in this region removed by operation, and both of whom showed titubation before treatment. These patients naturally presented associated symptoms, and as the orientation region includes the inside of the temporal lobe, and, since here we are close upon Gratiolet's optic radiations and Ferrier's perceptic centres, we have as associated symptoms hemianopsia and affection of smell and taste in practically all these cases.

The consideration of these more complex cases brings me to this conclusion, that if in any given case of vertigo we attempt a differential diagnosis of the seat of irritation we must first endeavour to localise the direction of the sense of vertigo and the direction of the forced movement. Having done this, we must next endeavour to exclude functional cases, and I suggest we ought to be able to exclude all cases arising simply neurasthenically. The next step must be to make a complete examination of the central nervous system, and by such means only can a correct localisation of the cause of the disturbance of equilibrium be obtained.

I have assumed, of course, that it is already determined how far the vertigo is true rotation, or is simply titubation. On the subject of titubation may I say in passing that most text-books, in speaking of titubation accompanied by vertigo, contain the statement that the titubation is not rendered worse by closing the eyes. My experience, based upon certainly a large number of organic lesions of the equilibratory region, especially pontine and cerebellar lesions, is that such titubation and vertigo is increased on closing the eyes.

A brief word must be added on treatment. As regards middle-ear disease, of course that is simple, namely, we treat the disease of the bone and the disease of the mucous membrane by ordinary surgical rules. As regards Ménière's disease—that is to say, cases where in conditions of gout or allied states congestion of the semicircular canals has been diagnosed, and the cases have been referred to me with the view of division of the eighth nerve—I can only say that although I have been quite ready to divide the eighth nerve I have never yet done so. The only reason I can assign is that I have usually suggested that such cases should be treated first with (1) Weir-Mitchellism, (2) with hydrobromic acid, and (3) anti-gouty treatment, and they have not returned. Whether the treatment has been successful and the operation rendered unnecessary I cannot say, or whether the patients have taken other advice. At any rate, I have never had occasion to divide the eighth nerve, though others have, and that was one of the reasons I was glad to join in this discussion this evening; the experiences of those who have divided the nerve or destroyed the labyrinth would be very valuable.

With regard to disease of the central apparatus, such disease is almost invariably a new growth, and then treatment becomes simply a question of removal of the growth in accordance with the localisation of its seat.

In conclusion, I wish to repeat how much obliged to you and the Society I am for the opportunity of sharing in this discussion and for the attention given to my remarks.

Introductory Address by Dr. Risien Russell.

Mr. President and Gentlemen,—Let me first thank you for your invitation to take part in opening this important discussion. I greatly appreciate the honour, which is enhanced by the fact that I find Sir Victor Horsley associated with me in the task.

I have assumed that in selecting this subject for discussion your Council had in view vertigo in the stricter and more limited sense of the term, as it refers to a subjective sensation of movement of an individual in some direction in space, whether this be accompanied by actual movement of the person or not, or a subjective sensation that surrounding objects, in reality stationary, are in motion. The term is, of course, also applied to a vague sense of light-headedness, without any definite sense of displacement of the body in any given direction, and without the sense of rotation of surrounding objects. The "giddiness" or "dizziness" experienced in such cases may, of course, interfere with equilibration sufficiently to cause reeling or staggering, as in the case of vertigo, in the stricter acceptation of the term.

Even in the more limited sense the subject is a very large one, so that we cannot pretend to deal with it as a whole in the time at our disposal for this discussion. I therefore propose to limit myself in the way that is indicated in the summary which you have each received. Even with this limitation, however, I fear that I have been guilty of including too much. As you will see, I have considered the subject from the clinical standpoint, as I concluded that Sir Victor Horsley would probably deal with the anatomical and physiological problems involved.

Few subjects could have been chosen for discussion that serve to illustrate better both how necessary it is for us to specialise, and how important it is for those who devote their time to the special study of different branches of medicine and surgery to mutually co-operate in their attempts to elucidate many of the problems of disease. That the Council of your Society recognise the need there is for such co-operation is evidenced by what your President has said, and by the fact that Sir Victor Horsley and I find ourselves assisting in your deliberations.

One of the most important conditions in which the otologist and

neurologist may mutually assist each other is in regard to certain organic diseases of the brain. The affections that bind us most closely are those in which there is intra-cranial suppuration, for this has its origin in the ear more frequently than elsewhere. As the original ear affection may be attended with vertigo, it becomes of extreme importance that when this symptom is due to grave intra-cranial mischief, this should be recognised, and care taken not to allow any local affection of the ear too much weight in the interpretation of the symptoms. It is, therefore, important for us to have the experience of otologists as to what extent symptoms of intra-cranial disease may be simulated by morbid conditions that are in reality limited to the ear, and I hope that we shall hear some definite opinions expressed on this point.

In dealing with organic intra-cranial disease I am compelled to limit myself to the consideration of gross diseases of the cerebellum or temporal lobes and extra-medullary lesions at the base of the brain. The vertigo in itself does not necessarily distinguish between a lesion at the base of the brain and one of the ear, for its characters may be the same in both. Morbid conditions at the base of the brain are to be suspected when in addition to aural symptoms there are other abnormalities present, of which none are more common than paralysis of intra-cranial nerves, though facial palsy is robbed of its full value owing to the fact that it may be produced by an affection of the nerve in its bony canal.

In dealing with lesions of the temporo-sphenoidal lobe there is little for me to add to what Sir Victor Horsley has already said, for he has told you what symptoms should lead you to suspect disease in this part of the brain. There are, however, one or two other points to which I should like to call your attention.

When the left temporo-sphenoidal lobe is affected any indications of the sensory form of aphasia, which is known as "word-deafness," are of the greatest possible value, as lesions of the hinder part of the superior temporo-sphenoidal convolution are responsible for producing this form of aphasia. It is also important to search for any indications of commencing hemiplegia. I say indications of hemiplegia, because there may be no marked manifestations of paralysis, and yet by careful testing of the reflexes, and by comparison of them on the two sides of the body, signs may be detected that are little less significant than the presence of actual paralysis.

On turning our attention to gross lesions of the cerebellum matters are somewhat different, for without assistance from other defects, and by confining our attention to vertigo alone, we may be

able to decide between local ear disease as opposed to disease of the cerebellum. My experimental observations on this point left no doubt in my mind that in lesions on the same side the direction in which the animal rotated when the eighth nerve was irritated was the opposite to that in which it rotated when an unilateral ablation of the cerebellum had been performed. I am therefore gratified to find that Dr. Grainger Stewart and Dr. Gordon Holmes, in an important paper on the "Symptomatology of Tumours of the Cerebellum," which they have contributed to the winter number of *Brain,* have completely confirmed these experimental results from their investigations. Their observations, though made in man, are as important as the results of experiments, for they were conducted on patients operated upon by Sir Victor Horsley and Mr. C. A. Ballance, and the cases were carefully investigated both before and after such operations were performed.

Stewart and Holmes found that in man, both in extra- and intra-medullary lesions of the cerebellum, external objects appeared to move in the same direction (from the side of the lesion to the normal side), but that the sense of movement of the individual differed in the two cases. It was in the same direction as external objects appeared to be moving in intra-cerebellar lesions, whereas it was in the opposite direction in extra-cerebellar lesions, so that the sense of rotation of the body was in the opposite direction to that in which external objects appeared to be moving. Moreover, when this sense of rotation was accompanied by actual displacement of the body, the patient tended to rotate towards the side of the disease in extra-cerebellar lesions and away from the side of the disease in the intra-cerebellar lesions. The results of their extra-cerebellar lesions accord with Adler and Guye's observations that in unilateral disease of the labyrinth there is vertigo, with a feeling of movement towards the affected side. Moreover, these observers found that in turning the head or body towards the side of the affected labyrinth a revolving vertigo occurred, in which objects turned in the same direction, a condition of things that did not obtain when movement was made towards the sound side, whereas Stewart and Holmes found that the giddiness and sense of rotation in cerebellar disease is less when the patient is rotated towards the affected side than when rotated away from it.

Apart from the forms of intra-cranial disease that we have been considering, there are certain other organic affections of the nervous system that must not infrequently first come under the observation of the otologist. I refer notably to diseases like

disseminate sclerosis and tabes, the former of which is especially likely to do so, for vertigo is a common symptom in this disease. It may be persistent, or it may occur in paroxysms, and it may be so severe that the slightest movement may induce or accentuate it. As tinnitus and deafness may be the accompaniments of the vertigo, the possibility of overlooking the real nature of the disease is considerable, unless a more general examination of the patient be made.

The ophthalmologist may be able to prevent mistakes in diagnosis in this class of case, as in the other organic diseases we have been considering, by the discovery of certain ocular defects, notably primary optic atrophy. The ophthalmic examination may, however, be negative, and it may require a more general investigation of the patient to enable the real nature of the case to be determined.

What has been said of disseminate sclerosis applies equally to tabes, in which disease, however, vertigo is not nearly so common. Although cases of the kind must come under the observation of the otologist, owing to vertigo, it is much more likely that they will do so owing to deafness, which is to be accounted for by an atrophy of the auditory nerve similar to that which may affect the optic nerves in this disease, or which has been said to be due to sclerotic changes in the ear in some cases, consequent on a perverted trophic influence, due to affection of the fifth nerve.

Although it is important to recognise that both of the diseases just referred to may reveal themselves by aural symptoms, among which vertigo may be prominent, they are not likely to engage the joint attention of the otologist and neurologist nearly so frequently as does the malady to which I next wish to refer, namely, idiopathic epilepsy.

Whether there has been loss of consciousness or not has always been regarded as of paramount importance in the diagnosis of these conditions, but I venture to think that too much reliance can be placed on this. I feel sure that otologists will bear me out when I say that an attack of auditory vertigo may be so sudden and violent that the patient is stunned, and undoubtedly does lose consciousness, or at any rate suffers from so much mental confusion that it is practically impossible to distinguish between this state of things and the transitory loss of consciousness that may result in the *petit mal* attacks of epilepsy associated with vertigo. While far from wishing to undervalue the importance of loss of consciousness in the diagnosis, I contend that certain reservations are necessary if this symptom is not to be allowed to mislead us. Neurologists will equally corroborate me when I say that vertigo

of epileptic origin may be either unattended with loss of consciousness, or the loss may be so slight that it is almost impossible to be sure that there has been any such defect. With the prolonged loss of consciousness of epilepsy I am not concerned, as its significance is beyond question. It is with the transitory attacks of loss of consciousness, attended with vertigo, that I am dealing. In regard to these, I think it may be safely said that it is only in the severe attacks of auditory vertigo, in which the patient is liable to be thrown to the ground, that consciousness may be blurred, and that it is only in the *petit mal* attacks, unattended by falling, that there is likely to be no loss of consciousness, or that the loss is so slight as to make it difficult to be sure whether this is or is not the case.

Much valuable information may be derived from considering the relationship of tinnitus and deafness to vertigo in such cases. Either or both of these symptoms may be the accompaniment of an epileptic attack, but apart from accidental complications neither is present in the intervals between the attacks. Herein is a difference of the greatest possible diagnostic importance, for in auditory vertigo, although both may be accentuated in association with the attack, their tendency is to exist in lesser degree in the intervals between the attacks. I hope that in the discussion that is to follow we shall have the experience of otologists on what is the most important point in this connection, namely, how often cases of auditory vertigo come under their observation at a time when vertigo is the first manifestation, and in which the patient is free both from tinnitus and deafness, for this is a question which is obviously of great moment in the diagnosis between auditory vertigo and epilepsy.

While it is important that we should be in a position to recognise the presence of organic disease within the skull, and to adopt the proper measures in treatment that the gravity of such cases demands, it is equally important for us not to allow symptoms in reality due to functional disturbance of the nervous system to mislead us. In short, we must remember that vertigo, not adequately accounted for by what has been discovered in the ear, may be due to a functional affection of the nervous system, and that it is not necessarily due either to the grave organic conditions that we have been considering or to epilepsy. The functional affections that may account for the symptoms are neurasthenia and hysteria.

Neurasthenia need not detain us long; for although vertigo, with inco-ordination, occurs, it is much more common for the giddiness complained of to be of the variety in which there is a vague

sense of instability, with some slight confusion of consciousness, a feeling of lightness of the head, or as if the floor or ground were giving way beneath the individual. In short, the giddiness does not usually come within the stricter sense of the term "vertigo" in the way that we have limited it for the purposes of this discussion. The vertigo is, as a rule, unattended by auditory symptoms, though tinnitus as an accompaniment is by no means uncommon. Deafness, on the other hand, is exceptional, for it is more common for the subjects of this affection to suffer from hyperacuity of hearing. Moreover, vertigo is but one of a long train of symptoms that belong to neurasthenia, which the otologist, like others of us, must be sufficiently familiar with, in view of the prevalence of neurasthenia nowadays.

Hysteria, on the other hand, may require a little more special knowledge to prevent mistakes in diagnosis, for the vertigo complained of may have all the characters of that due to ear disease. The absence of local signs may put the otologist on his guard, but he may be left in a state of uncertainty as to the correct diagnosis, which could possibly be removed by a more general investigation of the case by someone who is constantly dealing with patients suffering from hysteria in all the varied phases of this malady, and who therefore is so habituated to the general behaviour of such patients that diagnosis becomes comparatively easy, aided, it may be, by suggestion, to which such patients may so readily respond. Apart from this, and the detection of some of the hysterical stigmata, a patient of the kind may be inconsistent in his description of the vertigo, as was the case in a patient Dr. Tilley kindly gave me the opportunity of seeing comparatively recently. The patient was a boy, who complained of so much giddiness that he could not sit up in bed, much less stand, without support, but he said he felt as if he must fall in one direction when sitting and in the opposite direction when standing. He had been previously treated for disease of the ear, but Dr. Tilley satisfied himself that neither the local conditions of the ear, nor any other manifestations present when he allowed me to see the case called for surgical intervention. We agreed that the symptoms were in the main functional, a diagnosis that proved correct, in that the application of the Faradic current by means of the wire brush completely cured him of his vertigo and other symptoms. This case further illustrates the importance of recognising that organic signs, though present, need not of necessity have anything to do with the clinical picture of the present illness

of a patient, but may be due to past disease, a residuum that has no part in the symptomatology of the present affection, for we did not allow a slight weakness of the face on the same side as that on which the boy's hearing was defective to deter us from the diagnosis that enabled us to recommend the treatment which proved so effective.

I hope that I have said enough to make it evident that there must be occasions when the diagnosis of the vertigo of ear affections from that due to organic and functional diseases of the nervous system can be no simple task, and I feel sure that some of those who take part in the discussion that is to follow will be able to emphasise this fact from their own experience.

In trying to indicate by what means mistakes in diagnosis are to be avoided, I have not lost sight of the fact that the most experienced may fall into error. How important it is for us to attempt to arrive at a correct diagnosis, however, is made evident when we come to consider prognosis and treatment in cases of vertigo. So widely different are the affections that may have this as their chief symptom that the prognosis of necessity varies very greatly, as do the indications for treatment. Mere suggestion may be all that is needed to cure one patient, in whom functional disturbance of the nervous system underlies the vertigo, while in another a surgical operation of the greatest magnitude may be required owing to serious intra-cranial disease being responsible for the symptom. Considerations of this kind make it evident that the influence of diagnosis on prognosis and treatment cannot be overestimated in a case in which vertigo is the main symptom for which a patient seeks advice.

The President said he was sure that all had listened with profit and admiration to the masterly exposition of the subject from the standpoint of the neurologist and the physician. To have had this subject brought forward by such eminent authorities, especially in its relation to the more central sources of disturbance of equilibrium, was of great value to otologists, and was sure to help them in the differential diagnosis of aural vertigo from vertigo due to other sources.

Dr. Dundas Grant said it would probably be expected of the aurist that he would be inclined to diagnose Ménière's disease too readily in the cases of vertigo which came before him, but the speaker had frequently seen cases in which the general physician appeared to him to have diagnosed "Ménière's disease" on data

which the well-equipped aurist would consider quite insufficient. The difficulties were very obvious to anyone who had heard the remarks that afternoon. In many cases he (Dr. Dundas Grant) had endeavoured to localise the direction, in cases of so-called vertigo, of rotation, but it was very difficult to obtain from the patients sufficient information of a reliable character; the descriptions of the sensations given were so confused as to baffle the attempts. He had tried to ascertain whether the patients had more distinct loss of equilibrial power when standing on the leg corresponding to the side on which there was the labyrinthine lesion or on the opposite leg; but so far he had found that it differed in an extraordinary degree. Whether one might, with fuller knowledge, make that a differential feature he did not know, but for the present it seemed that as a rule in an uncomplicated labyrinthine case the unsteadiness was greater upon the leg corresponding to the side of the lesion, and when the opposite condition was present he was disposed to think there was probably a functional disturbance of a neurasthenic or hysterical character. That might be a means of help in diagnosis. With regard to hearing tests, one or two data were available which might be helpful. Given diminution of the periosteal conduction of the tuning-fork sounds ("nerve-deafness"), then if the labyrinth was affected to any considerable extent, hearing for high-pitched tones was markedly diminished as compared with the hearing for the lower tones of the scale. When, on the other hand, in a case of nerve-deafness—taking that as being associated with the vertigo—the hearing for high-pitched tones was comparatively well preserved, the probability was that the lesion was not in the labyrinth, but in some other part of the nervous system. Very often one found in such a case that there were some stigmata of hysteria or neurasthenia; and he presumed one would be justified in thinking of it as a functional affection of the auditory cortical centre in the temporo-sphenoidal lobe and of the portion of the cortex of the temporal lobe which had to do with equilibration. Certain cases of vertigo were unquestionably due to disease of the middle ear, and in regard to Sir Victor Horsley's statement of there being no rotation apart from disease of the labyrinth, he would, of course, allow that the disturbance he was mentioning was labyrinthine, although there might not be actual disease in the labyrinth itself. Thus in many cases of sclerosis of the middle ear there was well-marked vertigo; the patient was thoroughly giddy and might fall down, having what the older physicians would have called Ménière's dis-

ease. Probably the explanation of such a symptom was that the accommodative action of the windows of the labyrinth was no longer present; they were fixed through that form of osteitis which was called sclerosis of the middle ear, which produced rigidity of both the windows, with the result that any slight increase of pressure of blood or other fluid in the labyrinth would cause a disturbance therein which was not compensated for by the yielding of those windows. This he regarded as a labyrinthine symptom, although the actual disease was not in the labyrinth, and many of the cases referred to the aurist as Ménière's disease were of this kind. The pathological data in Ménière's disease were, unfortunately, very meagre. Possibly Ménière's original case was quite an exceptional observation, and in very few cases of Ménière's symptoms would one find what Ménière found, probably in not more than a few cases in a hundred. The question arose why he found them at all. Why did the patient in Ménière's case die? Effusion into the labyrinth was not a fatal accident, and there must have been some other lesion present. It was, therefore, difficult to say that the symptoms described by Ménière arose wholly or solely from the lesion which he discovered. At the same time, the probability was that they were so associated. Gellé examined *post mortem* several typical cases of "Ménière's disease," and found that the labyrinth was sound, but that there was fixation of the stapes in the fenestra ovalis. In Charcot's famous case on which he founded the quinine treatment there was a suppurative discharge from both ears. Of course that did not necessarily mean that there was not labyrinthine disease also, but there was something beside. He wished, then, to dwell on the fact that very marked symptoms which practically amounted to vertigo might arise in that way from a lesion which was in the middle ear.

The principle upon which Charcot started the treatment of vertigo by quinine was that he discovered that the vertigo ceased when the deafness became complete. The vertigo was rather an irritation symptom, whereas deafness was an obliteration symptom, and one had often seen cases with the most violent labyrinthine effusion, absolutely destroying the hearing, left afterwards comparatively free from recurrent vertiginous attacks. The quinine had not necessarily to be used for the purpose of producing deafness, but of exercising its sedative action upon the static labyrinth. That it had such an action has been proved by some very conclusive experiments by Dreyfus, published in a recent number of the *Zeitschrift für Ohrenheilkunde.*

Those experiments proved what the speaker had himself felt for many years, that quinine had a decidedly sedative action upon the vestibular nerve. It was not necessary to give it in doses which would produce deafness, and a small dose which scarcely touched the power of hearing would quiet the vestibular nerve. In fact, it was found by Dreyfus that long before he could induce deafness in the animals upon which he experimented he could produce indifference to the rotation upon the turn-table, indicating anæsthesia of the vestibular nerve.

He had only time to mention one other point, namely, that the vertebral arteries could be digitally compressed in the suboccipital region, in that way diminishing the pressure of the circulation in the basilar artery, and consequently in the internal auditory artery going to the labyrinth. If the vertigo was congestive, pressure in that spot ought to relieve the symptoms, and he believed that to be a diagnostic point which might help in very many cases. In two cases he had seen vertigo checked by compressing one vertebral artery. He did not know what was the pathology of such cases, but one of the subjects had intense vertigo; there developed afterwards paralysis of half the palate, the corresponding vocal cord, and complete hemianæsthesia of the same side.

Had time permitted, he proposed offering an analysis of about seventy cases of vertigo of various kinds which he had had the opportunity of investigating through the courtesy of his colleagues at the West End Hospital for Nervous Diseases, as well as discussing the effects of various therapeutic agents. He hoped to have another opportunity of supplementing these remarks.

Mr. Richard Lake said he was sure all present were extremely grateful for the papers by which the discussion had been opened. One very interesting point was the question of forced movement. He cited a case which he would say was not due to a gross lesion, and in which a man by accident took a double dose of jaborandi, with the result that he was thrown completely backwards. Another occurred to himself. He had consulted an aurist for tinnitus, and that gentleman, after suggesting various remedies, recommended the use of an electrode up the Eustachian tube. That was in 1886. His (Mr. Lake's) apparatus was crude and he had no means of switching certain cells on or off. He tried it with a small current, but had no galvanometer with which to measure it. He began with two cells and then put on two more, but when he took them out he found himself on the ground. He thought it was comparatively easy to recognise whether a case of vertigo was extra-

auditory or not by carefully testing. With regard to the gouty cases mentioned by Sir Victor Horsley in which operation had been found to be unnecessary, he did not think it safe to assume that the treatment had been effective; for there were people who put off the evil day as long as possible, but he believed there was always an auditory lesion as well as a gouty condition and tendency, and that the deafness in those cases to tuning-fork tests and reaction, was very marked during the vertiginous period. As the attack became more remote in time the ear gradually recovered to a considerable extent. Those cases formed a distinct class by themselves. With regard to eye movements, he thought slight eye movements must have some direct connection with the vertigo, *i. e.* the cases of irritation of the canal alone where there was slight nystagmus. He was sure that if the patient shut his eyes the vertigo stopped. When there was an exposed semicircular canal, then on syringing into, or otherwise irritating that ear, the resulting vertigo would be reduced extremely, if not diminished, by shutting the eyes.

Dr. Urban Pritchard said the discussion of such a subject, especially on an occasion like the present, made one feel the advance and increase of knowledge, so that no one could at once be a general surgeon, a general physician, and an otologist. Yet the question of vertigo, as had already been said, was related to all those branches. He thought all otologists would agree that in eight or nine out of ten cases of rotatory vertigo there was no difficulty in coming to a diagnosis, the presence or absence of nerve-deafness and tinnitus helping so very much. But there was that small residuum with regard to which the aurist wished to be also a general surgeon and physician. Amongst the causes of Ménière's symptoms he reminded members of the case which he related[1] to the Society in which a poisoning dose of quinine produced marked loss of equilibration as well as deafness and tinnitus, and he would be glad to hear whether the physicians had any experience of similar cases.

Dr. Wm. Hill said he had hoped to hear a better expression of opinion as to whether otologists had any ground for believing there was any definite gross lesion in the nervous system or in the ear in the majority of their cases of vertigo. From his own practice he could not bear out what Dr. Pritchard had said. He (Dr. Hill) had not found out that the fact of the patient being deaf or having tinnitus had any very great bearing on the case

[1] *Trans. Otol. Soc.*, vol. ii, p. 132.

from his point of view. He related two cases, one in which attacks of vertigo subsided after the removal of gall-stones, and another in which the attacks were relieved by the treatment of a dilated stomach with lavage. In those two cases Dr. Hill said there was no reason to suppose there was anything wrong with the nervous system except an over-excitability or congestion. In fact, he thought they compared with cases of laryngeal vertigo. Most of the cases of vertigo which came under his observation were those having no gross lesion whatever, such as tumours of the brain or effusions of blood or serum into the labyrinth itself. He was only relating what he believed to be his experience. He knew such cases did occur, and he would be interested to hear whether the experience of others bore out his own. He was in the habit of looking for some reflex cause.

Dr. Herbert Tilley referred to his case mentioned by Dr. Risien Russell, and which was also seen by the President. The boy was taken ill with an attack of so-called influenza just before Christmas, 1904; he suffered acute pain in, and a discharge from, the right ear. So great was the pain that he was sent to the hospital with a request from his doctor that the mastoid operation should be performed. The temperature was 102° to 103°. There was some delay about his admission, but when he eventually arrived the discharge had ceased, and, although there was pain on pressure over the mastoid, there was no œdema in that situation, the temperature was normal, and the boy lay listlessly in bed, with his eyes shaded from the diffuse light of the ward. He was very giddy, and the giddiness was of the nature which Dr. Russell had described. He took his food fairly well, but at one unhappy moment for him he said he "should never get well in that hospital; what he wanted was a private ward, where his friends could come and talk to him." That led one to think there was possibly some functional element in the case. On admission the drum was unperforated, but the boy was deaf to air- and bone-conduction on the right side, and there was a history of possible tubercular meningitis as a child—at any rate, a localised form of meningitis, which had caused delirium, and kept the patient in bed for five weeks. There was slight nystagmus, and slight facial paresis on the right side. Altogether the case was very interesting. Dr. Russell thought the symptoms were probably functional in character, and it was decided to watch the case before doing anything surgically. As that gentleman had stated, on applying the electrical brush the patient ran about the room, although

previously he had been lying in bed helpless, and was so giddy that he could not even sit up. The whole clinical picture was extraordinary and a very exceptional one.

The President asked whether it was the wish of the members to adjourn the discussion or to finish it at the present sitting. The latter course was decided upon.

Mr. E. B. Waggett said he did not wish to contribute to the discussion, but would be very glad if Sir Victor Horsley would state what was the relation between nystagmus and vertigo. He had in mind a case in which very marked nystagmus was invariably caused by inflation in a young woman who had chronically sclerosed ears, but no vertigo was produced. He would also be very grateful if he could hear a little more about the differential diagnosis between hysterical phenomena and those due to organic lesions. He had recently diagnosed a case of vertigo as hysterical in a young woman bearing all the stigmata of hysteria and none of the obvious signs of organic disease. She died within the year with an intra-cranial tumour.

Mr. Hunter Todd remarked that nothing had been said with regard to vertigo produced by peripheral irritation, and he would like to hear from the openers whether they could give any physiological cause for this form of vertigo. He had seen a case where a definite attack of vertigo simulating an epileptiform fit was produced by the insertion of an aural speculum into the external meatus; and cases were not unknown where such attacks had been cured by removal of impacted cerumen. Five years ago he had seen a man who was apparently suffering from Ménière's disease, and had such sudden attacks of vertigo that he could not follow his employment. It was found that one membrane was much retracted and was adherent to the inner wall of the middle ear. On inflation there was no improvement. He had definite middle-ear deafness on the affected side, and it was explained that it might be well to remove his ossicles. The malleus and incus were removed, and he was informed that since that time there had been no further attack. There was another class of case apparently of vaso-motor origin. He thought that in the majority of those cases where there was chronic middle-ear deafness in men with a gouty tendency and arterial sclerosis, the vertigo might be produced by vaso-motor disturbance. Recently he knew of a farmer, aged about sixty, who had been getting deaf for the last five years. He had middle-ear deafness and tinnitus on one side, and diminished bone-conduction, but good hearing for high-pitched tuning-forks. He suffered from sudden attacks

of vertigo—"bilious attacks," as he termed them. He fell down and could not get up, as he felt the room going round, and he often felt sick. He usually had to stay in bed for the day. He apparently suffered from "Ménière's disease," yet there was no increase of deafness. He sent the man to a physician, who found all the symptoms of degenerated arteries. He had had other cases which, on inhaling amyl nitrate, seemed to get worse; such cases seemed to improve on being given sedatives and drugs which diminished the arterial tension. He would be glad to hear from Sir Victor Horsley in what proportion of cases were there changes in the fundi if the cause were central, and whether the presence or absence of pathological changes in the optic fundi could be considered of diagnostic value.

Mr. Hugh E. Jones desired to refer to two cases which he had seen in the past year, cases of fracture of the base of the skull. One of them was that of a young woman who for eighteen months after incurring the fracture of the base had been unable to do any work on account of what was supposed to be aural labyrinthine vertigo. As the fracture was followed by suppurative otitis, he thought he was justified in doing a complete post-aural operation. He found in the neighbourhood of the aditus a mass of what seemed to him to be callus; there was, at any rate, a considerable thickening of bone. There was also a crack extending backwards and not covered by callus. He did not explore the labyrinth, but removed the thickened bone over the external semicircular canal and the floor of the aditus, and left the case. Ultimately she recovered, with practically complete healing of the cavity. He had recently heard that there had been no discharge, and that she had been practically free from the vertigo since. Whether the operation had in some way relieved the excess of fluid in the labyrinth, or had removed pressure from the foramen ovale, he could not say. It was quite possible that there was an element of neurasthenia in this case, but there was also undoubtedly true aural vertigo. He would like to hear what the experience of members had been, and how far one was justified in interfering in cases of fracture. The second case was one in which he thought interference was less justifiable. A man had had a fracture (which could be seen) through the tympanic ring, resulting in complete facial paralysis, and frequent attacks of vertigo, with partial loss of bone conduction. He thought that by removing the outer wall of the aqueductus Fallopii and by relieving pressure he might give the nerve a better chance, and that he might at the operation also clear up the cause of

the vertigo. He had noticed in other cases that when the nerve was divided recovery would take place if a mass of granulation could spring up between the ends. After doing the post-aural operation he found no callus, but a distinct thin crack running through the floor of the aditus, through or below the external semicircular canal. He opened up the aqueduct just below the external semicircular canal for about $\frac{1}{4}$ inch, but did not feel justified in opening the labyrinth at the first operation, because there had been no suppuration. The vertigo disappeared, and the facial nerve had within two weeks of the operation recovered a little power, *i.e.*, the naso-labial fold in repose had been restored, and since a much more marked improvement had taken place. He mentioned these cases with the idea of eliciting information and advice, rather than because they were in any way complete or informing.

Sir Victor Horsley, in reply, said Dr. Risien Russell, who first observed the deviation of the eyes from experimental lesions of the eighth nerve, was more fitted to pronounce an opinion on the nystagmus than he was. In several of the cases in which he had done the post-aural operation he had looked for nystagmus, or at any rate for deviation, and above all for skew deviation, and had found it absent. He had hoped that afternoon to have heard the experience of otologists on that point, which he regarded as a most important one, and one about which much more clinical information was required. With regard to optic neuritis, of course the older observations of Mr. Barker and Mr. Tweedy on the occurrence of optic neuritis in acute otitis media he had verified himself, but the vertiginous cases were the more chronic ones, and he had never seen optic neuritis in simple chronic otitis media, and if that was true in the experience of others besides himself, the occurrence of optic neuritis was of absolute value for intra-cranial localisation of disease. He had for many years been interested in the unilaterality of optic neuritis, and he believed that that occurred in all cases—certainly of the valuable collection of cases referred to by Dr. Risien Russell, published by Dr. Holmes and Dr. Grainger Stewart—those which came in the early stage when referred to him showed the greatest intensity of the optic neuritis always on the side of the lesion. It was therefore a fact of great clinical value. Many points of wide interest had been raised in the discussion, but he did not feel justified in commenting upon them. The only matter in which he could contribute to the discussion was naturally that of which he had had practical experience, and that lay much more nside the skull than in the middle ear. He attended the

meeting really to learn, and he was greatly obliged for the opportunity.

Dr. Risien Russell, in replying on the discussion, wished to explain that, as he mentioned in his opening remarks, one was limited to the question of vertigo, and he had not intended dealing with the whole subject, and that was why he had made no reference to such cases as those due to peripheral stimulation, or cases like those alluded to by Dr. William Hill, in which there were gall-stones or gastric troubles. He felt the subject to be so vast that it was impossible to try to deal with the whole of it. He much regretted that he had been unable to elicit from the members of the Otological Society some information on the diagnosis between auditory vertigo and epilepsy. He came to the meeting hoping to hear a good deal from the gentlemen present, but he had failed to stimulate remarks in that direction. Mr. Tod had obtained from Sir Victor Horsley what he (Dr. Russell) wanted to hear from otologists, namely how far ear disease might simulate intra-cranial affections. The question of optic neuritis was one in point. In conclusion, he thanked the Society for the honour they had done him.

TWENTY-SECOND ORDINARY MEETING.

HELD IN THE PATHOLOGICAL THEATRE IN THE MEDICAL DEPARTMENT OF THE VICTORIA UNIVERSITY, MANCHESTER.

Saturday, June 3rd, 1905.

THE PRESIDENT, DR. THOMAS BARR, IN THE CHAIR.

THE PRESIDENT said: Gentlemen,—Before proceeding with the communications on the agenda-paper allow me to offer a word of congratulation that we are now met in Manchester, the great centre of England. This is a meeting to which we have all looked forward with eager anticipation, because we knew that what Dr. Milligan and the Manchester profession undertook would be done well, and here on the agenda-paper we have a programme of work and of hospitality which, I venture to say, has never been equalled at any previous meeting of the Society. It is therefore not surprising to find so many members present to-day, probably the largest attendance we have ever had outside of London, and we are particularly to be congratulated that so many eminent scientific workers, not members of our Society, are with us and prepared to take part in the work. It is a great day for otologists to have the active and sympathetic co-operation of the most eminent professors of physiology and anatomy in this country. It is scarely necessary for me to intimate that non-members who are present are cordially invited to take part in the discussions.

The following gentleman was elected an Ordinary Member of the Society:

Bertrand Seymour Jones, F.R.C.S.Eng.

The following communications were made:

SUDDEN AND SIMULTANEOUS ONSET OF CEPHALIC BRUIT AND DEAFNESS.

BY P. MCBRIDE.

The case I am about to relate is extremely interesting and I think in several respects stands absolutely by itself. This, of course, may be a rash statement, as it is not possible to be certain that no

similar instance has been recorded; but from my researches in current literature I have been driven to the above conclusion.

The patient—a cultured clergyman, aged fifty-seven—consulted me in November, 1897. The chief complaint at the time of visit was of deafness and buzzing in the right ear. In February, on a Monday morning, he had an attack of sudden pain in the head, noises in the right ear, followed by sickness. Giddiness was not complained of, but the patient stated that he could not raise his head. There was no rise of temperature. On the following day he was much better, and able to dictate two letters. The noise and deafness in the right ear continued. Previously he heard well in both ears. On testing I found that on the right side the patient could not hear a watch tick and that in all probability there was absolute deafness for the voice, *i. e.* the patient could only hear a loud voice near the ear, and this was perceived whether the other ear was open or stopped. The tuning-fork applied to the middle line gave an uncertain result, but was better heard from the right than from the left mastoid. I may mention that all through bone-conduction seemed to be retained on the affected side.

On further examination, the right tympanic membrane was seen to be a little indrawn, while rhinoscopy revealed that both posterior and anterior nares were practically normal.

On introducing an auscultating tube into the meatus, I was somewhat astonished to hear a buzzing systolic bruit, which stopped on compression of the carotid. No pulsation was visible; the sound was heard by placing a stethoscope around the ear, being detectable above the auricle, but on this occasion most intense over the lower part of the mastoid. The intensity of the sound seemed to vary from time to time, and even from minute to minute. Rest and iodide of potassium were ordered. At an examination a few days later I have noted that the bruit was like the interrupted purring of a kitten. Heart sounds were normal, and pulses equal, while there was no detectable anomaly in the vessels around the ear. After this visit I asked the patient to see Professor Wyllie with a view to examination of his general and local state, and more particularly to ascertain the condition of the discs. Nothing abnormal was detected and Professor Wyllie was inclined to agree with my suggestion of intra-cranial aneurysm.

Nearly two years later I again saw the patient (June, 1899). He had never had a repetition of his first attack, but still heard a sound in his right ear. On auscultation now nothing could be heard and he expressed himself as feeling well. Hearing was as

before, with good bone-conduction on right side. During this visit, after the patient had changed from one chair to another, the noise came back and was audible both through auscultating tube and stethoscope. In February of 1900 I saw him again and he told me that after the least excitement he felt a fulness of the head. The bruit was audible, and I again strongly urged him to give up work. In 1901 things were as before, excepting that he occasionally felt giddy on stooping. On February 10 and 11, 1902, I again examined, and there was then no murmur to be heard either by tube or stethoscope, no matter whether the patient was sitting, stooping, or standing. In 1904 the bruit was audible only when the patient rose suddenly from a chair. My last examination was on March 6 of this year. He was feeling well—had occasionally heard booming. No bruit heard while sitting, but detectable on rising. It seemed to cease on full inspiration.

Let us now consider the signs and symptoms with a view to arriving at a diagnosis. A hale man in perfect health with no history of injury or recent disease was suddenly attacked by pain in the head and noises in the right ear, followed by sickness. Giddiness seems not to have been present in the true sense of the term and certainly did not last for any time. So far the case resembles what is known as Ménière's disease, but without giddiness. A peculiar feature was that hearing for the tuning-fork by bone-conduction seemed to be preserved, notwithstanding the absolute deafness for external sounds. In spite of this, however, I think that no one will question that the lesion causing the deafness must have occurred in the labyrinth. Moreover, the absence of any pronounced vertigo would lead to the belief that the semicircular canals had to a great extent or completely escaped. The most probable diagnosis at first was to my mind an embolism involving that branch of the internal auditory artery which supplies the cochlea. I have only been able to find one authenticated case of embolism of the internal auditory artery on record. Gruber (*Lehrbuch der Ohrenheilkunde*) refers to an example of it described by Friedrich. In this instance, however, the lesion was due to endocarditis. Now, in my own case, I think that we must connect the cephalic bruit with the deafness. Moreover, from the history we must assume that this cephalic bruit began as suddenly as did the other symptoms, viz. on a Monday in February; for the murmur was so loud that the patient could not have failed to notice it had it been present before. In trying to find an explanation, we are almost driven to assume a sudden

aneurysmal dilatation of one of the intra-cranial vessels. As, apart from headache and fulness, there were, after recovery from the acute attack, no symptoms, it seems useless to try to localise the affected vessel. That it belonged to the carotid system, however, seems certain, as the bruit was stopped by pressure on the common carotid in the neck. Here we are confronted by a difficulty in that the internal ear blood-supply is generally assumed to be by way of the vertebral arteries, although the internal auditory may arise from the basilar (Oppenheim, "Lehrbuch der Nervenkrankheiten," p. 679).

That the sudden deafness in this case can at first sight be best explained by the hypothesis of an embolism seems to me clear; yet it is equally obvious that more or less grave objections exist to this assumption. An alternative explanation would be found in the suggestion that a sudden lesion resulting in dilatation of a large vessel occurred, and that the circulation was thus profoundly altered in the cochlea. Failing these two propositions, we should have to consider the cephalic bruit and the deafness as merely coincident and as not bearing to one another any causal relation—a theory too improbable to be tenable.

Even if there were not the anatomical difficulty as to embolism, it would still be very remarkable that immediately on the occurrence of the lesion of a large vessel the internal auditory artery should become blocked. It is, I think (as before stated), hardly conceivable that the cephalic bruit could have existed previous to the date of the acute seizure, as the patient would then have certainly noticed it. For this reason, after my careful consideration, I am rather inclined to the view that the sudden occurrence of an aneurysmal dilatation of a large vessel so modified the circulation in the right cochlea as to do irreparable injury.

The President (Mr. Barr) said the case bore some resemblance to one shown at the Glasgow meeting a year ago. A man, aged twenty-eight, had a constant pulsation in his left ear for several years. It seemed to have originated in the impact of a heavy stone thrown at him and striking him behind the ear. The blow was such as to render him unconscious for several days. Through the auscultation tube a very distinct bruit, synchronous with the pulse, was heard in the ear. Both pulsation and bruit were entirely stopped by pressure on a particular spot behind the mastoid. Dr. Barr asked Dr. Nicoll to ligature the posterior auricular artery, which, however, produced no effect upon the

sounds. Afterwards the external carotid artery was tied. That was followed by gradual disappearance of the bruit, and afterwards of the pulsation. Intra-cranial aneurism was suggested at the time as a possible cause.

Clinical Notes of Cases.

By T. H. Pinder.

(1) *A vascular intra-tympanic growth, probably an aneurism by anastomosis.*—Mrs. G——, now aged sixty-four, became slightly deaf in 1897. Hearing then, watch 24·24. Constant tinnitus in right ear only. By November, 1900, hearing had fallen slowly too on contact on the right, with some giddiness the previous fourteen days. September, 1903, hearing on the right side was still OC and the membrana tympani was greatly injected. Since November, 1904, tinnitus, pulsating and roaring, increased in right ear. Has again been giddy, tending mostly to stagger to the right, less so the last two months, and not worse in the dark. Has had clonic spasm, one or two twitches at a time, of the muscles of the nape, and also for six months clonic facial spasm, labial and palpebral, on the right side, variable in amount but never absent for a single day. Systolic murmur heard by stethoscope over right mastoid and for an inch around; not heard on left.

Present state.—June 2, 1905. Facial spasm unchanged, complains now of roaring but never pulsating tinnitus in the left ear when lying upon that side. The murmur is more diffused too on right and can now be heard on the left mastoid, but not below that process. Unaltered by moderate compression of right carotid. The whole membrana tympani, retaining a high polish, is injected, the posterior segment bulges, the outline of the malleus is just visible, but the umbo appears as a bright yellow dot in a blood-red field. The heart-sounds are pure. Hearing—Watch, R. OC., L. 20 inches. Weber R +, but equal on closing left. Should further exploration prove the diagnosis to be correct, the disease is a rare one. Buck ("Diagnosis and Treatment of Diseases of the Ear," 1880) says: "So far as I can learn, there are but four instances on record in which a vascular tumour developed in a middle ear whose drum membrane was still intact."

(2) *Chronic suppuration of the middle ear; basal meningitis later.* E. Y——, aged fifteen, admitted August 24, 1903. Much pain

in head. Operation—tympano-mastoid exenteration. Cholesteatoma. Lateral sinus exposed by gouge. Apparently healthy. August 26—Semi-conscious, two rigors. Trephined and explored cerebellum and temporal lobe, no pus found. Venous plexus very hyperæmic. Very free bleeding during exploration. Pulsation of brain absent. Some retraction of head. (Dressings subsequently soaked with watery fluid until September 6.) Antiphlogistin applied to nape and spine. August 29—Retraction of head became so extreme as to interfere greatly with swallowing; barely conscious save for frequent moaning cry. Pupils dilated. Decubitus constant on right side. Continued much the same until September 9, when consciousness began to return and she complained greatly of pain in nape and between shoulders. Paralysis of right arm was then observed; has since disappeared. From this date steady improvement, and recovery without apparent mental deterioration. Ear found to be dry on January 14, 1904. Hearing distance, eight inches. Result suggests surgical interference in some forms of meningitis.

(3) *Intra cranial abscess; cerebellar; basal meningitis.*—F. J——, aged ten. Admitted August 11, 1903. History—Old-standing suppuration of middle ear. A fortnight before admission patient fell into the canal, recovering only after prolonged treatment. Pain in the head and stiffness of left side of neck followed. On admission, large superficial abscess on left side of head, puffy, without redness and but little projection of auricle. On incision, much foul, grey pus, pericranium necrotic, ragged, probe passed as high as parietal angle. August 12—Operation. On cutting through mastoid cortex, one eighth of an inch thick, putrid pus welled up under pressure, with severe venous hæmorrhage, stopped by plugging. On opening up mastoid, caries was found; the sinus was freely exposed by chisel. It was pulsating, and was covered, so far as exposed, by a greyish, mouldy-looking adherent deposit. August 13—T. 97°, unconscious, great retraction of head, internal squint. The cerebellum and temporal lobe were explored; no pus was reached. August 14—The cerebellum was further explored on the central side of the sinus, when free flow of putrid pus and some return of consciousness followed. From that date there was improvement, but with a hernia cerebri, which contracted in the cicatrix. Retraction of head continued until August 21. Squint disappeared three months later. The wound healed November 3rd, 1903. Mental condition good.

Epitome of Cases to illustrate the Results of Operative Interference in various Types of Aural and Nasal Disease.

By W. Milligan.

I. Suppurative mastoiditis with perisinus abscess. Cases 1, 2.

II. Stacke's operation. Case 3.

III. Radical mastoid operation; after-treatment with packing. Case 4.

IV. Radical mastoid operation followed by grafting operation. Cases 5, 6, 7, 8, 9.

V. Bezold's mastoiditis. Cases 10, 11.

VI. Tuberculous disease of the mastoid area. Cases 12, 13.

VII. Lateral sinus thrombosis operations. Cases 14, 15.

VIII. Labyrinthine suppuration. Cases 16, 17.

IX. Operation for chronic adhesive dry middle-ear catarrh. Case 18.

X. Temporo-sphenoidal abscess cases. Cases 19, 20.

XI. Cerebellar abscess case. Case 21.

XII. Bonninghaus's operation cases. Cases 22, 23, 24, 25, 26.

XIII. Paraffin injections for the relief of "saddle back" nasal deformity. Cases 27, 28.

XIV. Cases of frontal sinus suppuration. Cases 29, 30, 31, 32, 33, 34.

XV. Cases of sphenoidal sinus suppuration. Cases 35, 36, 37.

Case 1.—E. H—, aged twelve, admitted to hospital January 24, 1905, with symptoms of acute mastoiditis of two weeks' duration. Sub-periosteal mastoid abscess, pain over region of mastoid foramen and tenderness along upper portion of internal jugular vein. Temperature 101° F. Operation January 26, 1905. Mastoid opened up, groove for the lateral sinus explored, and small abscess evacuated.

Case 2.—H. B—, aged thirty-two, admitted to hospital November 14, 1904, with right-sided chronic suppurative middle-ear disease of three years' duration. Sub-periosteal mastoid abscess, deep-seated pain in the head, and temperature 100° F. Operation November 15, 1904. Mastoid opened and drained. Wound extended backwards to posterior fossa, evacuation of perisinus abscess.

Case 3.—M. E. H—, aged thirty-three. Left-sided suppurative middle-ear disease of many years' standing. Perforation of anterior portion of Shrapnell's membrane, bone granulations. Stacke's operation, October 24, 1901.

Case 4.—R. G—, aged forty-one, admitted to hospital November 30, 1904. Left-sided chronic suppurative middle-ear disease of ten years' duration. Main symptoms complained of—deep-seated pain in the head, constant tinnitus, vertigo, and occasional nausea. Radical mastoid operation performed immediate relief to all symptoms, rapid healing; packing of cavity employed.

Case 5.—A. S—, aged thirty, admitted to hospital November 17, 1898. Right-sided suppurative middle-ear disease of years' standing, deep-seated caries; fœtid discharge, bone granulations. Radical operation November 19, 1898. Grafting operation November 29, 1898.

Case 6.—S. K—, aged seventeen, admitted to hospital January 5, 1905, with old-standing right-sided suppurative middle-ear disease and subperiosteal abscess of a few days' duration. Radical mastoid operation January 12, 1905. Grafting operation February 1, 1905.

Case 7.—J. H— for thirteen years had suffered from left-sided suppurative middle-ear disease, pain over left mastoid process; frequent attacks of vertigo. Perforation of Shrapnell's membrane; caries. July 5, 1902—operation. July 15, 1902—grafted.

Case 8.—J. S—, for three years had suffered from constant discharge from the right ear, increasing deafness, and headache. Perforation of Shrapnell's membrane on right, bone granulations, caries of roof. Radical operation January 12, 1901. Grafting operation January 24, 1901.

Case 9.—B. B—, aged twenty-six. Left-sided suppurative middle-ear disease of eight years' standing. Perforation of attic, caries, granulations. Radical mastoid operation December 3, 1902. No packing used after first dressing. Grafting operation December 13, 1902.

Case 10.—M. I—, aged six, admitted to hospital December 12, 1904. Right-sided middle-ear suppuration of three months' duration. Œdema over mastoid process, severe apical pain. Temp. 100° F. Radical mastoid operation, opening up of perisinus abscess and one under deep cervical fascia, fistula through floor of tympanic cavity. Drainage by means of gauze wicks and small rubber tube. March 30, 1905, extra-dural abscess opened. April 4, 1905, internal jugular vein exposed in neck; vein ligatured, removal of glands.

Case 11.—M. B—, aged nine. Right-sided suppurative middle-ear disease of six years' duration. Admitted to hospital January 10, 1901, complaining of great pain in the head and exhibiting symptoms of cerebral compression. Extensive mastoid caries present, with evidences of a deep-seated abscess under the cervical fascia. Radical mastoid operation performed. Perforation upon inner mastoid table found leading into abscess cavity. Posterior fossa opened up and extra-dural abscess evacuated.

Case 12.—J. C—, admitted to hospital November 15, 1904, when aged ten months, with history of discharge from both ears from birth. Both membranes perforated, deep-seated caries and bone granulations. The tuberculous nature of the disease proved by inoculation experiments. Retro-auricular drainage effected, small sequestra removed from both mastoid processes, prolonged after-treatment complete healing.

Case 13.—A. G—, male, originally admitted to hospital when eight months old suffering from extensive tubercular disease of left mastoid process of six months' duration, enlarged periotic glands, extensive temporal bone necrosis, and facial paralysis. Several operations have been performed, glands removed, jugular vein tied, and an unsuccessful attempt made to improve the facial paralysis by a facio-hypoglossal anastomosis. The tuberculous nature of the disease was proved by several inoculation experiments at different intervals.

Case 14.—J. S—, aged sixteen, admitted to hospital January 26, 1904. Left-sided suppurative middle ear disease of many years' duration. Symptoms of lateral sinus thrombosis and mastoid cholesteatoma. Radical operation January 28, with ligature of internal jugular vein, opening up and evacuation of septic clot in lateral sinus. Maintenance of a permanent retro-auricular fistula.

Case 15.—M. E. T—, aged fifteen, admitted to hospital December 8, 1903, with symptoms of lateral sinus thrombosis and old-standing suppurative middle-ear disease. Radical mastoid operation performed; ligature of internal jugular vein, opening up of lateral sinus and evacuation of large septic thrombus.

Case 16.—S. B—, aged thirty-eight, admitted to hospital January 13, 1904, with history of suppurative middle-ear disease of some years' duration. Shortly before admission began to complain of deep-seated pain in the head, vertigo, sickness, and mental hebetude. Middle ears practically destroyed. Symptoms of invasion of left labyrinth. Radical operation performed; fistula found leading into region of semicircular canals. Sequestra consisting of portions of semicircular canals removed (photographs shown). Permanent retro-auricular fistula maintained.

Case 17.—P. T—, aged thirty-four, admitted to hospital August 17, 1904, with history of suppurative middle-ear disease of many years' duration and with symptoms of recent implication of labyrinth.

Radical mastoid operation performed August 21, 1904. Fistulous tract found leading into posterior part of vestibule, opened up, scraped, and packed.

Case 18.—A. D—, aged nineteen, for three years had suffered from advancing dry catarrh of both middle ears. Hearing power upon right side $\frac{1}{60}$; upon left side $\frac{2}{60}$; constant tinnitus of a very distressing nature upon right side. Local treatment persisted with for 13 months.

Upon April 2nd, 1901, the right middle ear was entirely cleared out, the stapes being removed at the same time. The antro-tympanic cavity was subsequently grafted. There was an undoubted improvement for conversation upon the right side, but not much change so far as hearing the watch was concerned.

Case 19.—E. C—, aged twenty-six, admitted to hospital May 6, 1897, complaining of very severe pain in the head, sickness, and marked mental hebetude. Pulse 70; temperature 97·8°. Right-sided middle-ear suppuration of many years' standing. Operation May 7, 1897. Radical mastoid first performed. Temporo-sphenoidal lobe exposed and explored. Evacuation of abscess containing two and a half ounces of fœtid pus; drainage by means of a rubber tube.

Case 20.—H. W—, aged 14, admitted to hospital complaining of severe pain in the head, sickness, photophobia, and drowsiness. Pulse slow and temperature subnormal. Mastoid operation performed. Temporo-sphenoidal lobe exposed by removing floor of middle fossa through the mastoid incision. Brain substance explored. Abscess containing two ounces of thick creamy pus evacuated. Drainage by means of a rubber tube, followed by drainage with strips of gauze. Since the date of operation this patient has shown signs of very irritable temperament.

Case 21.—K. C—, aged twenty-three, admitted to hospital May 6, 1903, in a comatose condition. Main symptoms: persistent pain over occiput, constant sickness, slow pulse, low temperature, marked photophobia. Radical operation May 7, 1903. Exploration of right lobe of cerebellum, evacuation of large abscess (three ounces), drainage by means of rubber tube; large cerebellar hernia; pressure by means of lead plate.

Case 22.—B. B—, aged fifteen, admitted to hospital January 24, 1905, suffering from almost complete left-sided nasal obstruction, due to deflection of nasal septum and left-sided septic middle-ear disease. Bonninghaus's operation performed January 26, 1905.

Case 23.—J. S—, aged seventeen, admitted to hospital August 12, 1904, suffering from complete right-sided nasal obstruction, due to deflection of nasal septum. Bonninghaus's operation performed August 13, 1904.

Case 24.—G. S—, aged eighteen, admitted to hospital suffering from nasal obstruction, due to deflected septum. Bonninghaus's operation performed November 25, 1904.

Case 25.—A. W—, aged nineteen, admitted to hospital with almost complete left-sided nasal obstruction, due to a very marked septal deflection. Bonninghaus's operation performed September 29, 1904.

Case 26.—F. H—, operated upon for complete left-sided nasal stenosis, January 22, 1905. Main symptoms—nasal obstruction, constant head colds, and headache. Bonninghaus's operation with, in addition, removal of the anterior one third of the middle turbinated body.

Case 27.—M. B—, aged twenty-four, admitted to hospital suffering from specific atrophic rhinitis and marked saddle-back nose. Injection of paraffin to correct nasal deformity.

Case 28.—T. S—, admitted to hospital March 17, 1904, suffering from specific ulceration of fauces, specific rhinitis, with very marked saddle-backed nose. Injection of white vaseline under pressure.

Case 29.—Miss H—, operated upon for chronic suppurative middle-ear disease of many years' standing, with extensive deep-seated caries. Radical operation March 7, 1902; grafting operation March 19, 1902. Upon June 24, 1904, the left frontal sinus was opened and drained on account of the presence of suppurative frontal sinusitis, with severe headache, which had resisted various minor surgical procedures, lavage.

Case 30.—M. K— operated upon on account of severe pain over left frontal sinus, accompanied by purulent discharge from left nasal passage. Duration of disease indefinite. Operation July 16, 1902.

Case 31.—J. S—, case of combined right-sided antral, ethmoidal, and frontal sinus suppuration. Antrum opened and drained through canine fossa. Frontal sinus opened two months later. Killian's operation performed March 29, 1905.

Case 32.—K. S—, aged twenty-six, admitted to hospital October 12, 1904, with history of long-continued left-sided nasal suppuration, pain over forehead and at back of left eye, inability to work. Temperature 100° F. Operation upon left frontal sinus October 13, 1904. Sinus thoroughly scraped, packed, and allowed to fill up with healthy granulation tissue.

Case 33.—J. S—, aged sixteen, admitted to hospital October 19, 1898. Both nasal passages full of granulation polypi with free discharge of pus. Prolonged intra-nasal treatment, removal of anterior ends of middle turbinals, nasal lavage, etc. January, 1899, both frontal sinuses opened through a median incision; drainage by means of nasal tubes.

Case 34.—M. B—, aged thirty-two, admitted to hospital with right-sided maxillary antral and frontal sinus suppuration of years' standing. Operation

November 13, 1902. Frontal sinus opened, curetting of diseased mucosa; removal of fronto-ethmoidal and anterior ethmoidal cells; drainage by means of rubber tube.

Case 35.—F. G. M— for many years had suffered from suppurative disease of nasal accessory sinuses. Upon examination right and left maxillary antral empyemata found present, also right frontal and right sphenoidal sinus suppuration. After prolonged treatment and the opening up and draining of the infected area the condition of the patient has much improved.

Case 36.—M. S—, main symptoms constant discharge of muco-purulent fluid from post-nasal space, especially in the morning. Constant irritating cough; no particular pain. Posterior ethmoidal and sphenoidal sinuses upon right side affected by suppurative inflammation. Middle turbinal removed November 12, 1904. Sphenoidal sinus opened and drained November 30, 1904.

Some Considerations regarding Ligature of the Internal Jugular Vein on account of Ear Disease.

By Dundas Grant.

Mr. President and Gentlemen,—I have long felt some uncertainty as to the exact value of ligation of the jugular vein as such in cases of otitic pyæmia, especially in view of the presence of other channels of communication with the right side of the heart. Such, for instance, are the condylar veins and basilar sinuses communicating round the foramen magnum with the posterior vertebral, and deep cervical veins, also the mastoid communicating with the posterior jugular. These are stated to be sufficient to carry on the circulation when both internal jugulars are ligatured. Further, the cavernous sinus, which receives the superior petrosal and communicates with the facial and the pterygoid plexus of the same side, as well as with its fellow of the other side, continues the communication with the right side of the heart.

For the prevention of extension of septic thrombosis, softening, and embolism, ligature of the jugular in itself is, from the point of view of dissecting-room anatomy, insufficient.

That suction into these other veins may take place is proved by the observation of Gemser (cited by Brieger[1]), who saw insuction of the wall of the lateral sinus during inspiration after the internal jugular had been occluded. The occlusion of the jugular cannot but favour in a powerful degree the extension of septic thrombosis into these various venous channels, and several cases are published (Heine[2]) in which this appears unquestionably to have taken place. In one of my cases, in which death occurred in spite of complete

[1] *Zeitschrift für Ohrenheilk.*, vol. xxix, p. 154.

[2] Heine, "Operationen am Ohr.," Leipzig, 1904, pp. 149 and 150.

sinus operation and ligature of the jugular, pus was found after death burrowing along the course of the deep prævertebral veins.

Even if actual suction is an exceptional occurrence, a certain amount of stasis must be induced, at least until the collateral venous circulation is freely established, and this is the condition most favourable to the occurrence of thrombosis. This is all the more serious if the blood is in contact with a septic focus. It is probably in this way that thrombo-phlebitis of the lateral sinus causes 50 per cent. of all cerebellar abscesses, and Pritchard has traced the entrance of septic material into the cerebellum through the small veins, which, as we know, empty themselves into the lateral sinus.

I cannot help thinking that in the case which prompted Mr. Bull's question at a recent meeting [1] as to the advisability of the ligature of the jugular vein, the stasis and reversal of current determined by the occlusion of the jugular may have contributed to the rapid breaking down of the congested portion of the cerebellum. Many of us would probably have ligatured the vein as he did, though we might, perhaps, have allowed the patient to die without having explored and evacuated the cerebellum with the gratifying result his skill and promptitude brought about.

It may be said that if these veins are patent as channels of mischief they may, on the other hand, be of value as means of collateral circulation. Undoubtedly they may be (if not occluded), and usually are, so that the rule is for the subjects of ligature of the jugular vein to recover after it. Thus, when it is tied in the course of the removal of cervical glands there is nothing to interfere with the collateral circulation. The effect is, however, not always benign, as at least one case (Rohrbach [2]) is reported in which death from œdema of the brain (rapidly increasing coma) resulted from ligature of one internal jugular vein during the removal of a tumour in the neck. It was found that the jugular of the opposite side was very imperfectly developed, and was too narrow for the return of venous blood from the brain in the presence of the ligated one. Linser [3] was stimulated to investigate the question as to the varieties in the relative calibre of the jugulars of the two sides, and found that in a certain percentage, 3 per cent., of cases one jugular was considerably smaller than the other, and hence probably incapable of carrying on the venous circulation if the other was occluded, the jugular foramen measuring not more than

[1] Journ. of Laryngol., Rhinol., and Otol., vol. xx, p. 250.

[2] Bruns, *Beiträge z. Klinisch. Chirurg.*, vol. xvii, p. 811.

[3] Bruns, *Beiträge z. Klinisch. Chirurg.*, vol. xxviii, p. 642.

3 or 4 mm. in diameter. The left was generally the smaller of the two. Hence he formulated the rule that it was more dangerous to occlude the right than the left vein, risky also to ligature a jugular which seemed unusually large, as there was a probability that the opposite one was inversely proportional to it, and therefore unusually small. Probably in a case reported by Dr. Luc[1] this condition was present, though we scarcely see that in the circumstances and with the symptoms present our *confrère* could have done otherwise than he did. Fortunately the disproportion is not often so great as to give rise to this danger, but its occurrence cannot be left out of account when we are considering the question of tying the vein.

Dr. Luc's case was one of acute suppuration of the middle ear in a man, aged fifty-one. Paracentesis was performed, and subsequently the mastoid operation, including apparently complete evacuation of all the cells down to the very tip. A few days later signs of suppuration in the sterno-mastoid muscle appeared and this was freely incised, while later still a focus of burrowing pus extending lower down was also opened. Dr. Luc then saw in the depth of the original osseous cavity of the petrous bone, 2 centimetres above the tip of the mastoid, a minute point from which pus exuded on pressing the swelling below. Next morning he was at first unable to rediscover this opening, but proceeded to explore the sigmoid sinus, finding, however, no perisinusal abscess to account for the pyrexia. Returning to the search for the osseous fistula, he was able to make an opening into the deep vertical row of cells lying between the sigmoid sinus behind and the aqueduct of Fallopius in front and found these communicating with a deep cervical abscess from which, on enlarging the opening, a copious flow of pus took place. He laid the whole cavity very freely open in its whole length. The temperature kept up, and was explained by the recurrence of erysipelas. When this passed off the patient appeared convalescent, but suddenly the temperature rose to 104° F. (40·2° C.). During the next few days it oscillated characteristically and a rigor took place. He then, under the very little chloroform which the patient's dull condition required, tied the jugular vein below the facial (the vein was probably filled with fluid blood, though he does not say so), opened the sinus and evacuated an organised lamellated clot, but no blood nor pus. Blood then came freely from both directions and he plugged the wound. The patient an hour later commenced to show signs of reaction when called by name, but gradually became more and more drowsy and died eight hours later. During this time the reflexes were vigorous on the left, the affected side, but absent to every form of stimulation on the other one.

No *post mortem* was permitted and Dr. Luc, after discussing the possibility of the death being due to shock or to the anæsthetic, attributed it to the ligature of the internal jugular vein.

Seeing the possible dangers attaching to ligature in cases in which the sinuses and the blood in them are normal, the circumstances are much more unfavourable in case of thrombo-phlebitis of the lateral sinuses, when there is already a probability of

[1] *Rev. Hebdomad. de Laryngol., etc.*, April 15, 1905.

occlusion by infected clot of the collateral venous channels already referred to.

What do we effect by tying the jugular? We may be supposed to prevent the passage into the circulation of micro-organisms or septic emboli detached from a softening clot. This, from what has been said above, is very imperfectly effected, and, indeed, the very opposite result may be produced. More especially is the effect likely to be bad if the lateral sinus is not at the same time freely opened so that its septic contents may be washed out by its own blood. I presume that the whole Society will agree that in the present state of our knowledge the vein should never be ligatured on account of otitic pyæmia, unless at the same time the sinus is operated on with the utmost thoroughness. The fact of having tied the jugular must not lull us into a false sense of security. It is only a proceeding ancillary to the local treatment of the disease in the sinus.

It has been recommended to put the ligature round the vein in the middle of the neck. This is an operation of the utmost simplicity, but its effects are somewhat complicated if the lower part of the sigmoid sinus is already occluded by a thrombus. The blood is arrested in the inferior petrosal sinus and the great facial vein, so that the risk of thrombosis of the cavernous sinus is greatly increased. Heine [1] has observed this to supervene immediately after ligature of the jugular and facial, and I have recently seen it in the practice of another surgeon.

Ligature above the facial vein is preferable, though the operation is a little more difficult. The stasis in the cavernous sinus is likely to be less marked, as the outflow into the facial vein from the ophthalmic can relieve it.

Probably the ideal spot would be just above the entrance of the inferior petrosal sinus. This is, of course, not possible by operation, but its equivalent is sometimes produced by an occlusive clot in the lowest part of the sigmoid sinus and the bulb of the jugular vein. If this could be depended upon not to undergo purulent softening, it ought not to be disturbed. If then the original infective focus has been cleared away, and the constitutional condition gives no indication of septic disintegration taking place, it should be left in place.

Our first duty is therefore to clear away the original focus, not forgetting the cells surrounding the casing of the facial nerve referred to in Luc's case. Our next is to explore the groove for the

[1] Heine, "Operationen am Ohr.," Leipzig, 1904, pp. 149 and 150.

lateral sinus as frequently the seat of extra-dural suppuration, which threatens to infect the sinus itself. This may by mere pressure bring about a mechanical thrombosis in the venous channel, the infection of this thrombus being a later event. If this view, which has much to support it, is accepted, the evacuation of the peri-sinusal pus may be sufficient to prevent septic phlebitis. The early exploration of this region on the slightest indication is our bounden duty. We may often be able to judge as to the presence or otherwise of an occlusive clot by placing one finger on the exposed sinus and the other on the jugular vein in the neck, and noting whether fluctuation is conveyed from the lower to the upper finger or not; the signs of such occlusion in the presence of pyæmic symptoms call first for exploration of the interior of the sigmoid sinus, and the exploring needle need not be rejected altogether if used with discretion. Incision is, however, usually necessary, and if there is no thrombus found in the sinus so far as it is accessible for exploration, there is every certainty that the obstruction is produced by one in the jugular bulb. Then it is that the jugular vein should be exposed. If it is collapsed, a ligature above the facial vein is only a desirable measure of security which is unobjectionable except so far as the scar and chances of wound-infection are concerned.

If the jugular above the facial junction is filled with blood, the inferior petrosal would seem to be acting as a substitute for the internal jugular, and we have to weigh its value if left free as against the risk of softening of the clot and septic embolism. If the latter seems to outweigh the former, the ligature is called for. In a case in which I had a recovery after ligation the jugular vein was full; and although I half suspect that my patient would have recovered without the ligature, I was influenced by the return of pyæmic symptoms. The fact of the vein being full of fluid blood interferes with its use for purposes of drainage, which is such an important part of the complete operation. Irrigation by means of a syringe introduced into the vein is sometimes recommended. For this proceeding, which is obviously extremely risky, I have proposed the use of a suction syringe by which broken down clot and *débris* may be dislodged from the bulb.

In certain cases tying the jugular vein is a life-saving operation. It is, however, more often an episode in the operation for the treatment of the suppuration in the lateral and sigmoid sinuses and the jugular bulb, permitting of a freedom of action in the evacuation of these channels which would often be impossible without it.

It is certainly avoidable in a large proportion of cases of thrombo-phlebitis of the sigmoid sinus in which only a portion of the clot has undergone purulent breakdown, the parts above and below consisting of firm, healthy-looking clot calculated to effect a perfect occlusion and to render a ligature unnecessary. In these cases the clearing out of the broken-down portion with the removal of a margin of sound clot at either extremity of it places the patient in many cases in perfect safety. This is illustrated by a number of cases narrated in the "Transactions" of the Otological Society as well as in Macewen's well-known work.[1] To these I have personally still another to add.

In many instances occlusion or resection of the internal jugular vein is quite innocuous. This is most often illustrated in the course of operations for the removal of tuberculous glands and other tumours in the neck. In other cases it is, however, as we have seen, not free from danger, and has seemed to have led to death from cerebral œdema, probably when the opposite jugular has been abnormally small and insufficient to afford collateral circulation. Apart from its danger, it involves an undesirable scar and affords scope for wound infection.

It should be avoided when possible, and should certainly never be practised before the most complete exploration of the sigmoid sinus unless there is evidence that suppuration is extending down the vein.

If after clearing out the purulent part of the clot as above described the pyæmic symptoms persist, it is right to expose the jugular vein with a view to ligaturing and perhaps opening it, as there is a probability that the persistence is due to suppuration in the jugular bulb. It must, however, be remembered that there are numerous other tributaries of the sigmoid sinus, suppuration in which may be the real factor. Should the patient be so circumstanced, as for instance by distance, that it is not possible to give the necessary supervision for the return of the pyæmic symptoms, the jugular may advisably be tied at the same time that the sinus is evacuated.

Time will not permit of a more thorough elaboration of the considerations on which I have ventured,[2] and I trust that the Council of the Society will at some early date select this subject for discussion, especially in view of the diversity of the opinions expressed in response to the question recently raised by Mr. Bull.

[1] "Pyogenic Diseases of the Brain and Spinal Cord."

[2] See also Schulze, *Arch. für Ohrenheilk.*, vol. lix, and Grunert, "Operative Evacuation of the Jugular Bulb," Leipzig, 1904, both with extensive bibliography.

Dr. URBAN PRITCHARD considered that Dr. Grant had exaggerated very much the danger of tying the internal jugular vein. When a thrombus was breaking down it was very important to tie the jugular, and it was still more important when the sinus was only partially occluded.

Mr. C. A. BALLANCE did not think Dr. Luc's case, quoted by Dr. Grant, was to the point. In certain cases the proper course was to ligate the jugular vein, and Dr. Luc's case did not lend support to the opposite view. In mural thrombosis it was often urgent to occlude the jugular vein.

Mr. CHICHELE NOURSE remarked that he could recall cases of septic phlebitis in which the lateral sinus having been opened and a clot found, ligature of the jugular vein was deferred until it was too late. He thought that delay in such cases was dangerous, and that it was safer to tie the vein at once. Dr. Grant's plan of allowing the blood to flow from the upper part of the sinus in order to wash it out appeared to him to be of doubtful utility, as the force of the current was too feeble to dislodge septic material adherent to the sinus wall.

Dr. KERR LOVE said that he had ligatured the jugular vein, and had never had any regret after doing so, but on several occasions he had regretted that he had not done so. In the last case that he had he was afraid the risks were increased, and the patient possibly died on account of delay in tying the jugular vein immediately the temperature rose after the mastoid operation had been done.

Mr. A. L. WHITEHEAD thought that a definite rule should be laid down that, whenever the symptoms justified operative interference with the internal jugular, the affected portion of the vein, so far as clot might be found, should be completely excised and not isolated between ligatures.

Mr. E. B. WAGGETT agreed with Mr. Ballance's view of the subject. He described a case in which the patient sat up in bed and combed her hair on the fifth day after ligation of the right jugular vein; a healthy clot slipped from the proximal section of the vein into the heart, causing obstruction of the pulmonary artery and death in forty minutes.

The PRESIDENT said a very important point was the stage in which ligaturing should be carried out. His plan had been, and he had not had reason to regret it so far, not to have the internal jugular vein tied until after the radical mastoid operation had been performed and the sinus exposed and opened. If rigors then occurred the vein was ligatured as soon as possible. The question

as to the stage in which the ligature should be applied was very important, and he would like to hear the opinion of Mr. Ballance.

Mr. Ballance said in one case he was called out to see a patient late one evening; he ligatured the vein in the country, and, as he was quite alone, he put the patient into a carriage and brought her up to London, and then at once carried out the mastoid operation.

Dr. Dundas Grant briefly replied, pointing out that of course it was only in a small proportion of cases that ligature of the jugular vein was in itself dangerous. This small proportion had, however, to be kept in view, and the ligature avoided if possible. The cases he had himself brought forward, and the type to which Mr. Ballance had referred, showed that it was often avoidable. He considered the clearance of all septic material from the sinus the essential part of the operation for sinus-phlebitis. The ligature of the jugular was only a subsidiary step which offered of itself no guarantee against further systemic infection. It was, however, often indispensable.

The Continuity of the Several Cavities of the Middle Ear, with Observations on their Development and on the Treatment of Acute Septic Inflammation of the Tympanic Cavity (so-called Otitis Media).

By A. H. Young and W. Milligan.

With few exceptions, both anatomists and otologists regard the middle ear as synonymous with the tympanum and accordingly only a single cavity, the tympanic cavity, is included in the middle ear. We hope to be able to show, however, that the middle ear includes three cavities, viz. the cavity of the mastoid antrum, the cavity of the tympanum, and the cavity of the Eustachian tube, all of which are simply modified parts of a continuous cleft intervening between the periotic capsule and the remaining parts of the temporal bone, which from the standpoint of otogeny may be termed "the primitive middle ear." [1]

The primitive middle ear, in man and mammals, is simply a

[1] Since, however, this term may lead to confusion if it is regarded from a phylogenetic standpoint, it may be better to designate it as the "middle-ear cleft," and it is to be understood that it corresponds to the modified and extruded inner part of the hyo-mandibular cleft of lower forms.

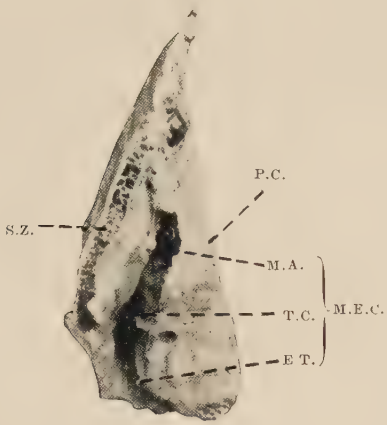


FIG. 1.—Right temporal bone of a child aged 4 years, showing the "middle ear cleft" after removal of its roof, the tegmen tympani. The cleft is seen to be continuous, and the several cavities of the middle ear are clearly distinguishable as modified parts of the primitive cleft.

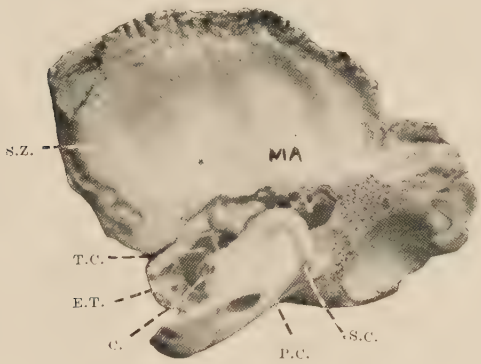


FIG. 2.—Right temporal bone of a child aged 4 years. The tegmen tympani has been removed, and the different parts of the internal ear mapped out. The specimen shows the middle ear and its several cavities.

S.Z. Squamo-zygomatic element of temporal bone. P.C. Periotic capsule. M.A. Mastoid antrum. T.C. Tympanic cavity. E.T. Eustachian tube. M.E.C. Middle ear cleft. C. Cochlea. S.C. Semi-circular canal.

To illustrate the continuity of the several cavities of the middle ear.

continuous cleft intervening between the periotic capsule and the united squamo-zygomatic and tympanic elements of the temporal bone. The periotic capsule forms the petrous and mastoid portions of the temporal bone, and it lies to the internal and posterior aspects of the middle-ear cleft; whilst the united squamo-zygomatic and tympanic elements form the outer, the anterior, and the lower boundaries of that cleft.

Occasionally, although very rarely, the tympanic element joins the periotic capsule and remains distinct from the squamo-zygomatic element, but in either case it is situated on the antero-external and inferior parts of the middle ear and helps to form the corresponding walls of that cleft.

The inner and outer walls of the middle ear join below without any sharp line of demarcation, and a well-defined floor of the middle ear is indistinguishable, but the correspondiug walls terminate above somewhat abruptly, and leave a wide interval which is roofed over by the tegmen tympani. In Fig. 1, Pl. I, the continuity of the middle ear cleft is seen by removal of its roof, viz. the tegmen tympani; the several centres of the middle ear are distinguishable, but they are better seen when, in addition to the removal of the roof of the middle ear, the different parts of the internal ear are mapped out (*see* Fig. 2, Plate I). The several cavities, and their continuity, are still better seen in the recent condition. Fig. 3, Plate II, is taken from a photograph of a horizontal section, cut transversely through the head of a child at birth through the middle ear. In Fig. 4, Plate II, a special dissection of a child at birth shows from a different point of view the same points seen on Fig. 3.

The preceding preparations show that "the middle ear," at an early stage, is a continuous cleft, and although the cleft becomes modified in parts, to constitute the several cavities of the middle ear, the continuity of these cavities is maintained. The cavities which collectively constitute the middle ear are, from within outwards: (1) the cavity of the bony part of the Eustachian tube; (2) the cavity of the tympanum; (3) the cavity of the mastoid antrum. These several cavities are also well seen if the united squamo-zygomatic and tympanic elements are removed and the inner wall of the middle ear exposed; this is easily effected if the temporal bone is examined before the junction of the squamo-zygomatic and petro-mastoid parts has occurred. These last named elements become joined together about the period of birth and certainly during the early part of the first year. At birth

therefore, the two parts are easily separable and the middle ear is readily exposed.

At birth the middle ear cleft is easily seen, and the separation of the two parts which bound the cleft shows the chief modifications which result in the separate cavities. At birth also the middle ear cleft is continuous, but a bulbous enlargement of the cleft which forms the tympanic cavity is interpolated between the Eustachian tube and the mastoid antrum. This bulbous enlargement is distinguishable at an earlier period, and it extends both upwards and downwards. Its upward extension forms the epitympanic recess or attic. Its downward extension forms the hypotympanic recess.

In still younger preparations, *e. g.* about the sixth month of intra-uterine life—*i. e.* directly after the fusion of the centres of ossification of the periotic capsule—the different cavities of the middle ear are visible and their continuity is even more marked.

In the adult the three chief cavities are, of course, distinguishable, and although in consequence a slight tilting up of the Eustachian tube and the greater extension of the tympanic cavity the continuity of these cavities is not quite so apparent, still, in view of the growth and development as seen in younger forms, it is obvious that the cavities are continuous and that they are simply modified parts of the primitive middle-ear cleft.

As a matter of convenience in description, we have more or less ignored the tympanic element, and it will be sufficient to state that it usually unites with the squamo-zygomatic portion, about the third month of intra-uterine life. Very exceptionally the tympanic element fails to unite with the squamo-zygomatic part.

This anomaly is rarely seen, but through the kindness and courtesy of Professor Symington, of Belfast, we have an opportunity of exhibiting the actual preparations and photographs of this condition in an adult temporal bone. The squamo-zygomatic part remained separate and distinct both from the tympanic plate and from the periotic capsule, and the interval between the two parts is the middle ear. It clearly demonstrates the nature of the middle ear as a cleft-like interval between the petromastoid and the squamo-zygomatic elements of the cranium.

From observations on the development and character of the middle ear, we think that we are justified in asserting that the middle ear includes three cavities—(1) that of the mastoid antrum; (2) that of the tympanum; (3) that of the Eustachian tube.

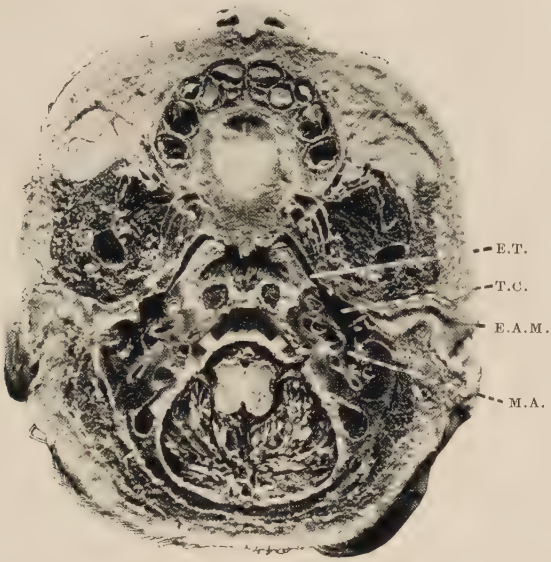


FIG. 3.—Horizontal section made by Professor Thompson of the head of a child at birth. The section was cut transversely through the head at the level of the middle ear. It shows the continuous cavities of the Eustachian tube, the tympanum, and the mastoid antrum, *i. e.* the cavities included in the middle ear.

FIG. 4.—Dissection made by Professor Robinson showing the middle ear and its cavities, and the relation of the external auditory meatus, in a child at birth. The dissection was made by sagittal and coronal sections, removing a wedge-like portion of the face until the middle ear cleft and the external auditory meatus were exposed. It shows from a different point of view the points seen in Fig. 3, but, owing to the oblique position of the specimen, it does not show the whole of the mastoid antrum.

E.T. Eustachian tube. T.C. Tympanic cavity. E.A.M. External auditory meatus. M.A. Mastoid antrum. P. Pharynx. T.C. Tympanic cavity.

To illustrate the continuity of the several cavities of the middle ear.

mastoid antrum, and it is of peculiar interest as well as of great practical importance to know that they appear at a much earlier period than is commonly supposed. Most writers affirm that the mastoid cells appear about the age of puberty. Dr. Buck [1] delineates well-developed air-cells or pneumatic spaces in a child aged five. Sappey [2] asserted in 1867 that the air-cells appear during the course of the first year, and that by the second or third year they are so far developed that they form a distinctive feature. Professor Symington sends us photographs and preparations of well-developed air-cells in a nine months' fœtus and in a temporal bone of an infant, aged one year, and Professor Arthur Robinson writes that there are distinct but small pit-like diverticula from the mastoid antrum before birth which he takes to be the rudiments of the future air-cells.

To briefly summarise the chief facts we wish to lay stress upon relating to the development of the middle ear and its cavities, we desire to state:

(1) That the middle ear is simply a cleft which intervenes between the periotic capsule and the squamo-zygomatic and tympanic elements of the temporal bone. The cleft is primarily continuous, and however much it may be altered in shape and modified in parts to form the cavities of the Eustachian tube, the tympanum, and the mastoid antrum, that continuity is never lost.

(2) That the mastoid air-cells develop at a much earlier period than is usually supposed.

With these facts in mind it occurred to us that the orthodox treatment of septic inflammatory lesions of the tympanic cavity (otitis media so called) would require reconsideration and revision. In a report on "The Treatment of Acute Otitis Media" to the French Society of Otology and Laryngology, May, 1904, by Lermoyez, Lubet-Barbon, and Moure,[3] it is stated that "the tympanum and mastoid antrum communicate largely with one another . . . there are no means of isolating these chambers under normal conditions, and any microbic invasion in one necessarily affects both. The result is that otitis media acuta is essentially formed by the association of an antritis and a tympanitis. From an anatomico-pathologic standpoint there is no otitis acuta without mastoiditis." As regards the treatment of otitis media, the report

[1] "Diagnosis and Treatment of Ear Diseases," 1881, p. 297.

[2] *Traite d'Anatomie*, Paris, vol. i, p. 160.

[3] *Annals of Otology, Rhinology, and Laryngology*, December, 1904, vol. xiii, No. 4, p 648 *et seq.*

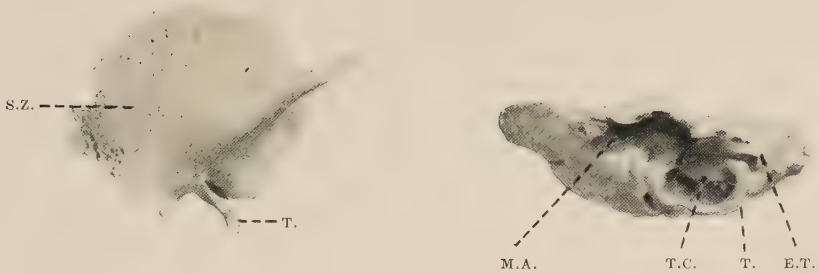


FIG. 5.—Right temporal bone at birth. The squamo-zygomatic element has been separated, and the inner wall of the middle ear exposed, showing the several cavities of the middle ear.

FIG. 6.—Right temporal bone of a six months' fœtus. Similar preparation to that seen in Fig. 5, but at a much younger stage. It shows all the cavities of the middle ear, but this continuity is more marked than at a later stage. Further, it presents indications of the commencing mastoid cells.

S.Z. Squamo-zygomatic element of temporal bone. T. Tympanic element of temporal bone. M.A. Mastoid antrum. T.C. Tympanic cavity. E.T. Eustachian tube.

To illustrate the continuity of the several cavities of the middle ear.

almost simultaneously through both the openings, viz. that of the perforated tympanic membrane and the external opening of the mastoid antrum. This is explained by the fact that the whole of the middle ear is filled with smoke after such repeated experiments.

These experiments, we think, conclusively prove that inflation of air or water is first forced into the mastoid antrum irrespective of whether the membrana tympani is perforated or not. We suggest that it would then be forced into the mastoid cells if formed, and the fact that these cells are formed early means that there can be no distinction as regards treatment in the child and in the adult.

The conclusions to be derived from these experiments are open to the criticism that an external opening of the mastoid antrum is not present until operative measures have been undertaken. The presence of an external orifice will undoubtedly modify greatly the passage of injected air or fluid through the antral cavity, but this modification is merely in the direction of increased quantity and increased facility of transit. The point we seek to emphasise is that even when the external aperture is wanting, there still exists a tendency for injected air or fluid to pass in the same direction. Beyond this we cannot go. Clinical experience teaches us that the disastrous results which follow the passage of septic material into the antrum are comparatively rare after Politzerisation, but we are convinced that, from the anatomical arrangement of the middle ear, they are by no means impossible.

Politzer states[1] on the authority of Michael[2] that "the view that in perforative inflammation of the middle ear purulent secretion is driven into the mastoid cells by the air-douche has been disproved," and that Michael had "demonstrated experimentally that the secretion is always expelled into the external meatus," presumably through the perforated membrane. We think that our experiment proves that Michael's view cannot be substantiated. Our contention, therefore, is that in acute septic disease of the middle ear inflation should not be employed, and if for any reason inflation be deemed advisable, the Eustachian catheter should be passed and air driven into the cavum tympani with great care and gentleness. We believe that in every case of septic middle-ear disease the first and primary requirement from the anatomical, pathological, and surgical point of view is free and unimpeded

[1] *Loc. cit.*, p. 81.

[2] *Archiv f. Ohrenheil.*, vol. xi.

Fig. 7.

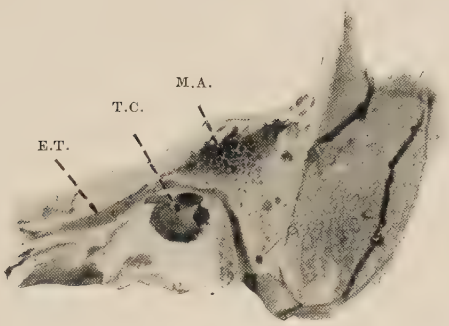


Fig. 8.

Figs. 7 and 8.—The middle ear and its cavities as seen in an adult.

E.T. Eustachian tube. M.A. Mastoid antrum. T.C. Tympanic cavity.

To illustrate the continuity of the several cavities of the middle ear.

Adlard & Son, Impr.

drainage and the securing of absolute rest. To carry this principle into effect, a free incision of the membrana tympani is essential, and it is equally essential that the incision be kept open in its whole length by re-incision where necessary, or by the actual removal of a triangular wedge of the membrana tympani itself. Furthermore, we believe that aspiration of the contents of the cavity of the middle ear by means of Siegle's speculum or Delstanches' rarefacteur is a therapeutic measure of the first importance, especially when combined with adequate drainage.

We desire to express our deep indebtedness to Professor Johnson Symington of Belfast, to Professor Arthur Robinson of Birmingham, and to Professor Peter Thompson (King's College) of London for their kindness in lending us many specimens and photographs.

All our illustrations were reproduced by photographs taken from actual specimens; and of these Figs. 1, 3, 5, and 8 were specimens lent to us by Professor Thompson from the collection in the anatomical department of the Middlesex Hospital; Fig. 4 is taken from a photograph for special dissection made by Professor Robinson; the remaining figures are taken from preparations in our own collection.

Professors Robinson (Birmingham), Paterson (Liverpool), and Thompson (London) took part in the discussion of the paper.

Dr. Kerr Love asked Professor Young whether he regarded the smoke experiment as a parallel to what took place in an unopened mastoid process? Dr. Love did not think that there was any great revolution in store for the practice of aural surgery on account of Professor Young's paper. The anatomical points brought out had for a long time guided aural surgeons in their operations. In particular, the smoke experiment as described by Professor Young did not follow the conditions present in the unopened mastoid process during inflation.

Dr. Milligan said the main objection apparently which had been raised was that they had opened the mastoid antrum and had conducted experiments in an already opened-up bone. They had, however, also conducted the experiments upon a bone which had been opened, and in which the opening had been closed by a piece of stout tissue paper, and they had observed exactly the same thing happen, viz., the mastoid antrum became full of smoke before there was any escape of smoke through the perforated membrana tympani. The practical point was that in acute septic infections of the middle-ear politzerisation or even catheterisation was

injurious on account of the forcible inflation of septic material into areas not already infected. They had reason to believe that inflation was extensively practised, and that as a result cases became complicated which otherwise would probably not be the case. Their experiments had been repeated many times upon adult and upon young temporal bones, and the result had always been the same. They wished to emphasise the importance of free drainage from the middle ear, and the necessity of avoiding forcible inflation during acute inflammatory affections on developmental and on clinical grounds.

Some Experiences of the Operative Treatment of the Middle Ear Complications of the Exanthemata.

By A. K. Gordon.

I feel that I ought to apologise in the first place for submitting to a meeting of the Otological Society a record of personal experience, rather than the more usual scientific details of cases and references to authorities. I have, however, adopted this course deliberately, as I believe that it may facilitate subsequent discussion—which is, after all, the more valuable part of a communication.

I propose to deal with the middle-ear complications of scarlet fever, and to suggest measures, administrative and clinical, for their more adequate treatment in the acute stage.

Let us first examine the conditions as they exist at the present time. In Manchester about 2000 cases of scarlet fever are annually notified to the Medical Officer of Health, of which about 1800 are removed to Monsall Hospital. Of these, 394, or about 20 per cent., suffer from discharge from one or, more commonly, both ears. In London about 12,000 are admitted to the hospitals of the Metropolitan Asylums Board, of which 1700 have otorrhœa. I do not propose to treat of cases that are isolated in their own homes, as it is not possible to obtain accurate information about them.

Speaking of isolation hospitals generally, some of these children with otorrhœa are therein cured completely, some are only apparently cured (and to this point I shall return presently), while others leave hospital after a stay of anything from eight weeks to six months with a purulent discharge from one or both ears. They are advised to consult an otologist or attend his

clinique without delay, but this advice is in practice but seldom followed.

Now, it is evident from the answers which I have received in reply to a circular addressed to members of this Society and others that otologists do not as a rule have the opportunity of seeing cases of scarlatinal otorrhœa in the acute stage—at all events, in hospital practice. It is also apparent that a very large proportion of the cases that are ultimately operated upon by them for suppuration within the temporal bone, or its results, have originated in an uncured scarlatinal otorrhœa. Personally, I should put the proportion here as high as three fourths, though the general opinion seems to be a little short of that—about one half or two thirds. Even if a child with an otorrhœa escapes intra-cranial mischief, he often becomes deaf or stupid, but I need not enlarge on this here except to point out how extensive is the mischief which may result. We have, for the reason that I have just mentioned, good work and literature in plenty about the results, but very little about the cause.

Speaking again quite broadly of isolation hospitals in general, I am sorry to say that the amount of observation and treatment that these cases get in the acute stage is quite inadequate. What happens, as a rule, is that when discharge from the ear is noticed —for there is in scarlet fever seldom any preliminary pain—the ear is ordered to be syringed by the nurse with some lotion or other, perhaps most commonly boracic acid solution, without any preliminary inspection of the drum. If the ear does not "dry up" soon, the lotion is changed, again without inspection of the affected part, and, if after perhaps one or more further changes of lotion a "cure" is not effected, the patient is discharged, the period of detention depending upon the Medical Superintendent's views of the infectiousness of ear discharges rather than on the site and extent of the disease in the particular patient. It is seldom, for instance, that any change is made in the method of applying the lotion, though I certainly believe that in the hands of some nurses it is doubtful whether the fluid from the syringe ever reaches the tympanum at all.

I need not here enlarge on the appearances of the membrane and tympanic cavity in the acute and sub-acute stages. Usually very rapid destruction of membrane results, and the tympanum is seen to be full of granulation tissue and pus, which can often be seen to come from the region of the attic. Sometimes, however, the perforation is small, and subsequently the tympanum is seen to

contain hard masses of dried secretion. An important point, however, is that from the first the discharge is in the large majority of cases profuse, and it seems scarcely possible that it could all come from the tympanum. Moreover, even where there is a free exit from the tympanum externally, it soon becomes fœtid. Obvious external signs of implication of the mastoid region are, however, rare in scarlet fever. I think it is clear that in scarlet fever there is, as a rule, infection of the mastoid antrum at all events, and possibly of the cells too, from the first. In many cases there must be early necrosis of bone in this region.

In many cases of scarlet fever that die of general toxæmia or of early septicæmia from absorption from sloughing inflammation of the fauces, one finds pus in the mastoid antrum, and occasionally slight necrosis of bone there. But this evidence is inconclusive where there has been otorrhœa.

A case that occurred in my own practice quite recently is interesting in this connection. On the ninth day of a moderately severe attack of scarlet fever a small child, aged two, had an attack of pyrexia, for which there were no obvious clinical signs until the twelfth day, when the nurse reported a slight twitching of the right facial nerve; there were no local mastoid signs, and there was no otorrhœa. I found the membrane much injected, and incised it freely, but there was no pus seen. The facial twitching disappeared, but the pyrexia persisted, and it was thought to be explained by some ill-defined signs at the apex of the right lung. On the eighteenth day of disease the child died, and I made a *post-mortem* examination within seven hours of death. I found the right antrum and mastoid cells one mass of carious bone and intensely fœtid pus. With this there were no tympanic signs whatever; nothing except a little congestion was found to account for the pulmonary signs. I think it possible that suppuration within the mastoid process, without any local signs clinically, may be the cause of the septicæmia from which many patients with scarlet fever suffer in the acute stage.[1]

I have said that in a fair number of cases the cure of the otorrhœa is only apparent. Though the ear may have been dry for a week before the discharge of the child from hospital, I have sometimes found on inquiry that a relapse has taken place, usually about a week or a fortnight afterwards, when the patient has returned to the usually less cleanly surroundings of his home.

[1] Since this was written I have made *post-mortem* examinations on two almost precisely similar cases.—A. K. G.

This fact was impressed upon me in examining the records of patients who had apparently given rise to attacks of scarlet fever in others after discharge. In many of these alleged originating cases there had been otorrhœa at some time during residence, which was apparently cured, but which had returned later; within three or four days of the onset of the recurrent otorrhœa the second child became infected with true scarlet fever. In these cases it seemed to me to be evident that the antrum as well as the tympanum had been affected all along, and that the communication between the two cavities had been blocked, with the result that the tympanum dried up, while the disease in the mastoid region progressed. Later on, with an increase of the amount of pus in the antrum, the obstruction broke down, and discharge of infective matter again took place externally. Of the correctness of this view I obtained recently some slight confirmation when I opened the mastoid antrum and cells in two patients for the cure of an intermittent otorrhœa which had ceased for a fortnight in each case. I found quite extensive disease in the antrum and cells, with blocking of the aditus by firm granulation tissue. I believe that this conception of the pathology of scarlatinal otitis is not new to otologists, though I fear that its importance is hardly yet understood in isolation hospitals.

What, then, should be the treatment of the early otitis? Can we cure it completely in the fever hospital? To a certain extent, I think, it may be prevented. There are two obvious predisposing causes—post-nasal obstruction, with or without tonsillar hypertrophy, and the custom of treating the throat in the acute stage with a syringe that cannot be, and hands that seldom are, sterilised. Of these causes the treatment is sufficiently obvious. Adenoid vegetations should be removed as early as possible, and I personally operate in the acute stage of the faucial affection if they are causing any retention of secretion in the naso-pharynx, and otherwise a week to a fortnight after the temperature has fallen to normal. For the treatment of the throats, the douche is substituted for the rubber or glass syringe, and the hands of the nurse are encased in rubber gloves. It is also advisable to render the mouth as aseptic as possible from the commencement, and for this reason carious teeth should be extracted in the acute stage of the disease.

When otitis has occurred, however, if the perforation is a small one it may be enlarged with advantage, or a larger one made lower down. It is scarcely ever possible to incise the membrane

before perforation has taken place, on account of the absence of preliminary pain. At one time I attempted to apply various intra-tympanic measures for the cure of the otorrhœa, such as intra-tympanic douching—especially towards the attic—curetting of the granulations, swabbing the cavity with various antiseptics, inflation of the Eustachian tube, and even removal of the ossicles, with thorough curetting through the meatus. But I was disappointed to find that these procedures, which had appeared to me to be so successful in an Ear Department (I am speaking of ten years ago), had very little effect on the cure of the otorrhœa in scarlatinal cases.

Then I took to simply opening the mastoid antrum in order to secure better drainage, and though carious bone was often found and removed, yet the progress was subsequently unsatisfactory: healing took a very long time, and frequently the operation was a failure as regards cure of the discharge. Then, too, the results as regards hearing were not at all good.

Accordingly some six months ago I commenced to perform the radical mastoid operation, removing the incus and malleus, and leaving a smooth cavity in the orthodox manner, in cases that had resisted treatment intra-tympanically for from two to five months. I have, so far, operated on eighteen ears in this way, and the results, both as regards cessation of the discharge, and the subsequent hearing, have been, I think, very good. In sixteen there has been complete cure, in one the operation was an absolute failure, and there has been one death. The complete failure occurred in a child, aged fifteen months, in whom I found the bone very soft, and there was the most extensive necrosis I have ever seen. I was unable to get it all away, as the infant took the anæsthetic badly and the operation was a long one. Some weeks afterwards a large sequestrum came away from the labyrinth, and the infant still has an otorrhœa. The case that died, did well until the tenth day, when symptoms of meningitis developed, the sinus, the posterior and middle fossæ, the cerebellum, and the temporo-sphenoidal lobe were explored with a negative result. At the *post mortem* there was a patch of thick lymph, with surrounding pus on the under surface of the cerebellum and pons. No anatomical reason could be found for the infection, and I conclude that this must have been a lymphatic extension due to stirring up and insufficient removal of infective matter in the region of the lateral sinus at the original operation.

I know well that a series of as few as twenty cases proves

nothing; and I am not, therefore, in a position to do more than suggest that the complete radical operation may ultimately turn out to be the best method of treating these scarlatinal otorrhœas when they resist simpler measures, and that it should be performed at an earlier period of the illness than formerly—that is to say, in hospital practice, before the patient is discharged from the isolation hospital. I have, at all events, come to the conclusion that it is our duty both to the individual and the State not to let the children go with uncured otorrhœas; even when we think we have cured them we may be deceived unless we take care that there is no infective matter left in the temporal bone. Can we do this by any intra-tympanic method whatsoever?

How is this necessary otological work to be done? A very good suggestion was made two years ago by Dr. Milligan, that all residents at a fever hospital should have previously received some training in throat and ear work at a recognised clinique. This is excellent, as far as it goes, and speaking from my own experience, I can testify to the advantage that the possession of this knowledge by my own colleagues has been to the patients. But it does not go far enough. Even if the staff are competent, they have not at all seasons the time to deal adequately with otorrhœa. There are other problems in a fever hospital besides the treatment of ears, and, especially in times of epidemic pressure, these force themselves on one's attention, and often entail periods of continuous hard work. Moreover, in a hospital devoted entirely to acute diseases, there are emergencies to be dealt with that will not wait.

Personally, I think it almost imperative that a consulting otologist should be appointed to every isolation hospital where scarlet fever is treated, who would work with the medical superintendent. The old idea that operations are unsafe in a fever hospital, though it dies hard, is vanishing in the light of the localising of infection there as elsewhere, to dirty hands and methods. Failures are no longer put down to aerial infection or obscure influences, and it is the duty of the State to cure as well as isolate the patients under its care.

These appointments, however, will not be made unless and until the general public treat an ear discharge as they would an hernia, as a source of danger, and be anxious to have it cured. And I can think of no better method of bringing forward such an idea than submitting it to the impassionate discussion and skilful criticism of such a Society as this.

Dr. Macnaughton-Jones said the paper had a peculiar interest for him, inasmuch as he was connected with a fever hospital for eleven years, and during that time had also a very large public dispensary district which kept him in constant touch with various epidemics; at the same time side by side with these duties he had otological work in a special hospital. If measles and scarlet fever were only taken into consideration, and smallpox and other zymotic exanthemata were excluded the field of their discussion was materially limited. His experience of the relative frequency of ear troubles in those two diseases was that scarlet fever came first and measles second, and as to their permanent influence he had to come to the conclusion that whilst scarlet fever had more immediate effects on the ear, measles appeared to him to cause more serious later changes in sclerosis and permanent middle-ear affection with deafness. As regards typhus fever it was only in the more serious and malignant cases, often of a purpuric type, that the ear was affected; then possibly through hæmorrhage. Smallpox, of which he had seen some 2,000 cases, did not, save in exceptional instances, affect the hearing, and then it was generally when the outer ear was invaded by the pustules. As regards preventive treatment, he believed that most efficient measures could be taken to anticipate these complications. He quite agreed with Mr. Gordon that nothing like sufficient attention was paid to the ear during the acute stages of the exanthemata and that period when the sequelæ were likely to occur. With reference to the treatment, there was not then time to say more than that as a rule careful attention should be paid to the nose and throat by antiseptic gargling, post-nasal and nasal douching. For his part, he had for many years regarded the nasal passages, the Eustachian tube, and tympanic cavity as one tract so far as infection was concerned. There was one point about the perforation of the tympanum in scarlet fever that he should like to mention, viz., that so far as hearing was concerned he had often found that the larger the perforation the better the hearing results. There was no question as to the infectivity of the ear-discharges in the exanthemata.

Mr. Knyvett Gordon was unable, owing to the lateness of the hour, to reply to all the points raised. He stated that he was aware that in two of his cases shown to the meeting healing was not completed, but he had shown them purposely direct from their homes, and without previous dressing or preparation. He did not advocate the performance of the radical operation in all cases of

scarlatinal otorrhœa that resisted intra-tympanic treatment for two months, but he suggested that this procedure might with advantage be adopted in selected cases at a much earlier period than had previously been the custom. Any dogmatic inference from so few cases as he had treated in this way was, of course, impossible.

Professor W. Stirling gave a demonstration with experiments *On Otocysts and the Ampullary Apparatus.*

Local Anæsthesia for Aural Operations, with Special Reference to Dr. Neumann's Method.

By B. Seymour Jones.

Dr. Milligan has kindly invited Dr. Stoddart Barr and myself to contribute a paper dealing with the several methods of procuring local anæsthesia for the performance of minor and major operations of the ear. A short survey of the methods previously known will be given, and to this will be appended a detailed description of a new process, originated and perfected by Dr. Neumann, Assistant in Professor Politzer's Aural Clinic, Vienna.

Since the introduction of cocaine, and especially since the discovery of Schleich's infiltration method, local anæsthesia has been widely and increasingly employed in the specialities and for general surgical operations. It is only in the operative treatment of ear disease that local anæsthesia has hitherto attained little success, because the great majority of anæsthetic mixtures are ineffective in this region. The reason for this is to be sought in the anatomical structure of the hearing apparatus. The skin of the outer meatus and tympanic membrane are clothed with a very resistant epithelial investment, which presents an impassable barrier to all locally applied anæsthetic agents. Up to the present a mixture has been employed for anæsthetisation of the tympanic membrane for paracentesis which corrodes the superficial epidermis before it is able to exert its anæsthetic action on the part. This mixture consists of equal parts of cocaine hydrochloride, concentrated carbolic acid, and menthol; it is applied to the surface of the membrane by means of small pledgets of cotton-wool at the exact site chosen for puncture. In practice this method is only relatively successful, and by no means produces an ideal anæsthesia.

When the tympanic membrane is wholly or partially destroyed,

various solutions or mixtures of cocaine, eucaine, or tropacocaine are employed as instillations. For the removal of granulations, small polyps in the external auditory canal and tympanic cavity, extraction of ossicles, etc., a solution of cocaine hydrochloride, varying from 5 to 20 per cent., is instilled. Gray's solution—*i. e.* cocaine hydrochloride, 0·5; ol. anilini; absolute alcohol, āā 5·0—is also used as an instillation. A better method consists in the topical application of dry crystals of cocaine on the point of a probe.

But with each of the foregoing methods the external meatus and remnant of the hammer remain quite sensitive to operative manipulations. Again, it is quite impossible to satisfactorily anæsthetise the antrum and attic by instillations of cocaine, as the latter do not penetrate the niches and recesses of the cavities owing to the presence of air or retained secretion.

Injections into the tissues themselves were first suggested and practised by Frey and Gomperz. Frey's method affords a means of painlessly extracting large polyps, especially those filling and protruding from the meatus of the ear; this is effected by injecting a 3–5 per cent. solution of cocaine into the substance of the outgrowth. This method also suffers from the disadvantage that the walls of the meatus are still susceptible to the passage of instruments, although the anæsthesia extends to the tympanic cavity.

Gomperz was the first to use Schleich's solution for the extraction of the ossicles, in the year 1900. He infiltrated the skin of the external auditory canal in the zone of v. Tröltsch's bundle, from which the vessels and nerves diverge to the tympanic membrane. He claimed by this method to have developed sufficient anæsthesia for the performance of the operation. Schleich's solution has also been employed by Alexander, Alt, and others both for the acute and radical operations. Alexander states that although he is quite satisfied with this method for the acute cases, Schleich's solution fails to procure satisfactory anæsthesia for the radical operation.

Since December, 1903, Dr. Neumann, assistant in Professor Politzer's clinic, Vienna, has been using a modification of Schleich's solution, the administration of which requires a special technique. The results obtained thereby have been so satisfactory as to justify the assertion that a general anæsthetic can be dispensed with in the great majority of cases. The method consists essentially in injecting a mixture of 1 per cent. warm cocaine solution and tonogen (five drops to each cubic centimetre of cocaine solution) under the periosteum. The initial attempt of Dr. Neumann to procure sufficient

anæsthesia for the performance of a radical operation by the subperiosteal injection of this solution was attended by such success that he was encouraged to pursue his investigations and to extend the method to acute mastoid operations. Over twenty cases of acute mastoid abscess have been operated upon under local anæsthesia in Professor Politzer's ambulatorium with complete absence of pain and insignificant hæmorrhage. The technique described below represents the perfected method as practised for the radical operation by the author in Professor Politzer's aural clinic, Vienna.

One hour previous to operation the patient is given a good meal, for it has been found by experience that the toxic symptoms of cocaine are less marked when its injection is preceded by the ingestion of food. The field of operation is then cleansed with ether, washed with ether soap, swabbed with perchloride lotion, and finally purified with ether.

The following solutions should be prepared in advance:

(1) One per cent. solution of eucaine β in distilled water with five drops of tonogen to each cubic centimetre.

(2) One per cent. solution of cocaine in distilled water with five drops of tonogen to each cubic centimetre.

(3) A twenty per cent. solution of cocaine in distilled water.

Tonogen is the trade name applied to an extract of suprarenal gland manufactured by Richter of Budapest. It corresponds to Parke, Davis and Co.'s adrenalin chloride, 1 : 1000, which may be substituted for it. Tonogen contains no chloretone, which Neumann asserts impairs the anæsthetic activity of cocaine.

The syringe (Fig. 1) with which the injection is made was devised by Dr. Neumann. It consists entirely of metal, and its capacity is 1 cubic centimetre. The needle has a tapering barrel extending for the major portion of its length to give it increased rigidity. A middle piece, bent to an obtuse angle, is inserted between the syringe and needle when infiltrating the meatus. The syringe is also furnished with a grip for the fingers mounted on a movable ring. The sterilized syringe is now filled with eucaine solution and immersed in hot water until it is warmed to 50° C. This latter step accelerates the anæsthesia and should not be omitted. The administration of the injection may be performed with the patient in the sitting posture or lying on the opposite side. The former position is preferable. At this juncture the supervision of the patient is committed to an assistant, and the onus of keeping an attentive observation on the pulse, pupils, and general condition rests with him throughout the operation.

Method and site of the injection.—The ear is pulled forward and the needle of the syringe thrust through the skin at a point about the middle of the mastoid process, marked A in the figure, and a few drops of the solution expressed. The needle is then pushed upwards, in the line AZ, towards the temporal ridge until it meets the bone. The contents of the syringe are thereupon injected beneath the periosteum. Having refilled the syringe with eucaine solution and warmed it, the needle should be reintroduced through the same puncture and directed downwards towards the tip of the mastoid, AX in the figure. 1 c.c. is then injected beneath the periosteum of this region. The same procedure is repeated in a backwards direction, AY in the figure. The auricle is next

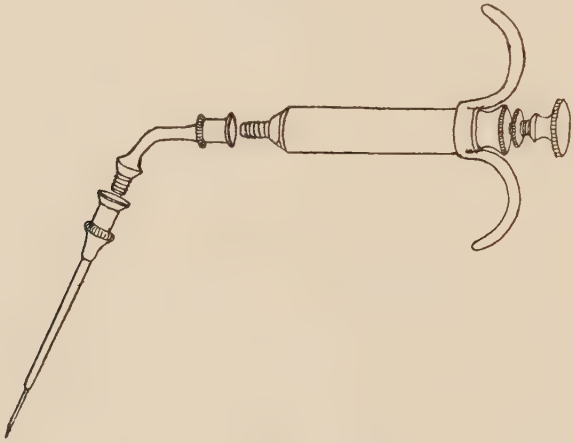


Fig. 1.

pulled well forward to expose the auriculo-mastoid fissure, the needle entered about the centre of this, and 1 c.c. of the eucaine mixture injected between the anterior aspect of the mastoid process and the cartilage of the meatus, B in the figure.

The syringe is next filled with cocaine-tonogen solution, a speculum inserted in the ear, and 1 c.c. injected into the superior wall beneath the periosteum at the junction of the cartilaginous and bony portions of the meatus. The technique of this will be furnished later in the paper. A second syringeful is injected into the inferior walls and a half-syringe of the cocaine solution into both the anterior and posterior walls in the same zone. Finally, a small tampon of cotton-wool soaked in 20 per cent. cocaine is pushed into the tympanic cavity, where it remains until exposed during the course of the operation by the opening of the antrum

and attic. The parts are then covered with a sterilised dressing and the patient placed in a recumbent position in bed or on the operating table. The operation is deferred for twenty minutes to give the anæsthetic solution time to obtain its maximum effect. During this interval the patient is kept under attentive observation, and symptoms such as headache and nausea are combated by the administration of cold black coffee.

With regard to the operation, there are certain indispensable details to be observed; apart from these it is conducted in the usual manner for a radical mastoid. To summarise them, a soft pillow

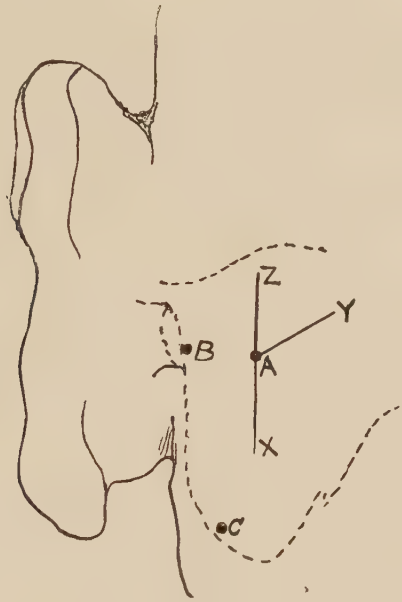


Fig. 2.

should be placed under the patient's head to diminish the jarring, the chisel or gouge should be held more horizontally than is customary, and only small chips of bone removed at a time in order to reduce the concussion to a minimum. Burrs may be substituted for the chisels with advantage; no more force than is absolutely necessary should be exerted by the retractors. From time to time during the course of the operation cold black coffee is administered to the patient; this is effected by allowing him to siphon it from a jug by means of a tube.

The technique for acute mastoids only differs from the foregoing in that no injections of cocaine-tonogen solution are needed for the external auditory canal, and, moreover, an occasional supplementary

injection of eucaine solution is made near the tip of the mastoid process.

Cases of acute mastoid abscess formation in which there exists a subperiosteal collection of pus are unsuited to this method, the reason assigned being that as the inflamed and softened periosteum is separated from the bone its elastic pressure, a factor necessary to absorption, is impaired.

In the majority of patients operated upon by Neumann under local anæsthesia no real pain was complained of. Some, however, stated that they felt dental pain during the chiselling; in others it caused headache; a few claimed to have felt the initial cut or were distressed by the traction of the retractors. In one or two female subjects nervous anticipation of the operation prevented its continuation without appeal to a general anæsthetic. When the antrum is opened, the extraction of the ossicles may sometimes give rise to a disagreeable sensation. The plastic cutting of the flap is invariably painless, although the entire operation outlasts an hour. A conspicuous advantage of the method which materially facilitates operating is its comparative bloodlessness.

The reason for the employment of eucaine for the retro-auricular injections is that its action is less toxic than cocaine. Cocaine is chosen for the auditory canal and tympanic cavity because its action is more permanent, and the parts it is needed to anæsthetise are dealt with last.

At the June sitting of the Otological Society of Vienna, 1904, Gomperz reported a case of ossiculectomy, in which he used Neumann's cocaine tonogen mixture for injection, and therewith obtained the most perfect anæsthesia. The solution was injected into the superior wall of the external auditory canal in the zone of v. Tröltsch's bundle, in accordance with the method he had previously published in 1900. Since then a large number of ossiculectomies and other minor operations of the tympanic cavity and auditory canal have been performed by Professor Politzer and Dr. Neumann in the ear clinic, Vienna, by the aid of this method.

The method consists essentially in making an injection of cocaine-tonogen solution under the periosteum of the external auditory canal. The anæsthesia resulting is almost perfect; it lasts over half an hour and enables the operator to perform any conceivable minor operation in the auditory canal and tympanic cavity without the slightest pain to the patient. Among the operations to which it is applicable may be mentioned resection of the external wall of the attic, ossiculectomy, division of intra-

tympanic adhesions, extraction of polypi, paracentesis, cauterization of granulations, and tenotomy of the tensor tympani.

Technique of the injection for intra-tympanic operations.—If a discharge from the ear exists, the meatus and tympanic cavity are cleansed by the instillation of hydrogen peroxide and syringing with lysol solution, dried and plugged temporarily with iodoform gauze. In the absence of discharge, for instance, when the severance of dry adhesions is designed, it suffices if a tampon of sterilised dry wool is pushed into the innermost part of the meatus, and the external part, including the site of injection, purified by swabbing with pledgets of cotton-wool saturated in alcohol. The auricle is then washed with ether soap and water, and finally sponged over with ether. The side of the head should now be covered with a large square of sterilised lint with a central window snipped out for the ear and the gauze tampon removed. A solution of one per cent. cocaine with five drops of tonogen or adrenalin added to every cubic centimetre should be ready to hand, heated to 50° C. The syringe figured above is warmed and then filled with the mixture.

Site of the injection.—The subperiosteal injection is made at a point on the superior-posterior wall of the external auditory canal where the cartilaginous and bony portions fuse. To locate this, a round speculum, the lumen of which is somewhat greater than that of the canal, is inserted in the meatus and pressed gently onwards, whereupon the formation of a whitish wrinkle of skin indicates the termination of the cartilaginous section. The needle is thrust into this fold and a few drops of the solution expressed; the needle may now be made to penetrate more deeply, keeping the point in close contact with the bone and the remainder of the fluid injected beneath the periosteum. The greatest care should be exercised to avoid puncturing the periosteo-cuticular lining of the canal, as such an accident complicates the further injection of the fluid owing to its escape through the puncture. After the injection a white bulging of the superior wall of the meatus should be looked for; this confirms the success of the injection; in the absence of this a second attempt must be made. This protrusion gradually subsides as absorption takes place.

Finally, a tampon of cotton-wool soaked in tonogen is pushed into the tympanic cavity against the field of operation. In prolonged operations it is advisable to administer a second injection in the antero-superior wall of the meatus. The operator must now wait ten to eighteen minutes. At the expiration of this the anæsthesia

may be tested by the application of a probe. Preparatory to the injection in nervous patients the site of the initial puncture may be deadened by projecting an ethyl chloride spray upon it.

At the conclusion of the operation a mixture of boracic acid and anæsthesin in equal parts is dusted over the area. This effectually obviates the pain which was found to ensue about an hour afterwards, and moreover, by absorbing exuded blood, tends to prevent the establishment of discharge in dry cases.

As regards the dangers of the method, none need be anticipated. Slight headache and palpitation have been complained of by some patients, but these seem to be the only discomforts incidental to the method, and are probably due to the effect of the suprarenal solution.

Local Anæsthesia for Aural Operations, with Special Reference to Dr. Neumann's Method.

By J. Stoddart Barr.

Mr. Seymour Jones has described in detail the method of carrying out the local anæsthesia according to Dr. Neumann. I only intend to give here my own personal experience of this method, to draw attention to some of the difficulties which I have met with; and, lastly, to make a few observations based on experiments undertaken on fresh temporal bones for the purpose of demonstrating where the fluid goes to after being injected under the periosteum of the auditory meatus.

As regards my experience of the method, owing to my return to Scotland being so recent, I am not able to bring forward a large series of cases on which this method has been tried. But I think the number will be sufficient, along with those mentioned by Mr. Jones, to prove that the claims of Dr. Neumann, namely, that complete anæsthesia is produced on the walls of the external meatus on the tympanic membrane and other walls of the tympanum, are justified.

For purposes of producing anæsthesia in the ear I have used Dr. Neumann's method twelve times; three times for ossiculectomy and removal of the external attic wall, three times for removal of aural polypi, once to allow of dissecting a skin web out of the external auditory meatus, and five times for paracentesis of the tympanic membrane and other small intra-tympanic operations. With only

one exception the result was most satisfactory. In no case was more than one syringeful, *i. e.*, 10 minims, injected, and in several cases 6 to 8 minims sufficed. In one case where ossiculectomy with chiselling away of the external attic wall was performed, the injection at the postero-superior angle of the meatus of 10 minims gave half an hour's anæsthesia. In every case where I succeeded in carrying out the method, the sensation of pain was completely absent. Patients, however, complained somewhat of crunching noises, or the vibrations of chiselling. In one case, in which a radical mastoid had been performed, I injected 10 minims of the cocaine and adrenalin solution in order to try and produce anæsthesia, so as to allow of scraping of the inner wall of the cavity. The anæsthesia produced was not so complete as in the other cases, because the injection of the fluid could not be carried out so effectively, owing to the changed conditions. An advantage is, of course, the absence of excessive bleeding, so that the parts are freely visible during operation.

I would like to mention that I have tried this method very successfully in operations on the nasal septum and the inferior turbinals, and I am sure that anæsthesia so obtained is much better than after the application of cocaine and adrenalin to the mucous membrane.

Dealing with the difficulties met with in performing the injection, I confess to having found the technique rather difficult in some cases. The great difficulty is in keeping the point of the needle under the periosteum. One is very apt to push the needle through the cutaneous periosteal layer into the lumen of the canal. This difficulty is increased by certain peculiarities in the external auditory meatus, to which I attribute the cause of my one failure to inject the fluid. In this case the cartilaginous meatus was very narrow, whilst the osseous meatus was very wide. The superior osseous wall arched sharply upwards and inwards. For this reason, after piercing the skin over the cartilaginous meatus, it was difficult to avoid repiercing the skin over the osseous meatus, so that the point of the needle projected into the lumen of the canal. In addition to this difficulty the cutaneous periosteal layer in this case was extremely thin and friable, so that it tore away readily on inserting the needle underneath it.

Wishing to find out, if possible, where the fluid injected in this manner made its way to, I have injected one or two temporal bones in the fresh state with a solution of methylene blue. The injection was made, in a similar manner as described, at the junc-

tion of cartilaginous and osseous parts of the meatus. Here are three temporal bones so treated. In the first only a few drops were injected. In the second and third at least 20 minims were used, but a considerable quantity was lost owing to its escape outwards along the path made by the needle, the tissues in the dead state having lost a great deal of their elasticity and so failing to grasp the needle tightly enough. As far as I could make out by a study of these specimens immediately after injection, the fluid on coming to the Rivinian segment is split up into two streams. One is directed downwards in the meshes of the middle layer of the tympanic membrane and flows under the muco-periosteal layer lining the floor of the tympanum. The other stream is directed upwards under the muco-periosteal layer of the external wall of the attic, over the roof of the attic, and diffuses itself over the inner wall of the the tympanum, there to meet the stream which has passed along the floor of the tympanum. In addition, as you will see, the fluid diffuses itself along the aditus into the antrum and mastoid cells. The question is, does the fluid flow under the muco-periosteum, or does it simply burst through this not very resistant layer, say at the membrana flaccida, and spread over the cavities I have mentioned? These specimens, I am afraid, prove definitely neither one nor the other, but a careful examination and section of the bones immediately after injection proved to my own satisfaction that the fluid burrows its way underneath the muco-periosteum and floats it off the bony surface. The results of these experiments gave me the idea that perhaps the injection of various medicaments in adhesive catarrhal or sclerotic conditions of the middle ear might have a more beneficial effect than when injected through the Eustachian tube. The fluid would be absorbed directly by the vessels of the parts, and the local action would probably be more efficient. The action of potassium iodide or iodine in specific disease of the labyrinth might, if applied in this manner, lead to more encouraging results. In order to test the utility of this, I have injected, in a case of otosclerosis of a very pronounced character, 10 minims of a half per cent. solution of nitrate of pilocarpin. As to the result I cannot at present say much, only that it is encouraging enough to lead me to pursue my experiments.

Mr. Jones and I are indebted to Dr. Neumann, of Vienna, for opportunities of trying this method of producing local anæsthesia in Professor Politzer's clinique.

An Analysis of 5000 Cases of Ear Disease, with Special Reference to their Ætiology.

By Lindley Sewell.

The following analysis has been compiled in order to obtain some idea as to the relative part the various ætiological factors play in the production of ear disease. The figures, one fears, are only approximately correct, due mainly to the fact that often patients only come under observation long after the onset of the disease, and are unable to give an accurate history of their trouble; and, again, many causes which acted during infancy or childhood are forgotten or unknown to the adult. The results are compiled from a series of 5000 consecutive cases occurring in the private practice of my teacher, Dr. Milligan, who kindly suggested this paper and allowed me the use of his notes. A broad summary will be given, the various agents being taken in their order of frequency as causal factors. A detailed list of lesions found is appended.

Of the 5000 cases no absolutely definite cause could be assigned in about half the number. In the remainder *adenoid vegetations in the naso-pharynx* were predominant, totalling 802, or 16 per cent. of all cases; 59 per cent. of these had associated with them hypertrophied tonsils.

In 44 cases, or 1·1 per cent., *hypertrophied tonsils* alone were the discoverable cause of the disease.

In 538, or 10·77 per cent. of all cases, plugs of *cerumen* were present.

In 355, or 7·1 per cent. of all cases, a history was given of frequently recurring *head colds*, and no history of any other causal factor could be obtained.

The *exanthemata* were the cause of 224, or 4·5 per cent. of all cases. Of these—

Scarlet fever	was	responsible	for	139	cases
Measles	,,	,,	,,	51	,,
Typhoid fever	,,	,,	,,	15	,,
Diphtheria	,,	,,	,,	9	,,
Mumps	,,	,,	,,	6	,,
Whooping-cough	,,	,,	,,	2	,,
Smallpox	,,	,,	,,	1	,,
Chickenpox	,,	,,	,,	1	,,

In 125, or 2·5 per cent. of all cases, *influenza* was the factor.

In 75, or 1·5 per cent. of all cases, *furunculosis* was present.

Direct exposure to cold (as opposed to head colds) appeared to be a probable and predominating factor in 51, or 1 per cent. of all cases.

Trauma was accountable for 45, or ·9 per cent. of all cases.

Syphilis was the cause of 25 cases (of this number 22 were congenital).

Bathing was the cause of 22 cases.

In 20 cases the affection followed closely on *mental worry or shock.*

In 15 cases the lesion was associated with *gout.*

In 14 cases the lesion followed *confinement or child-bearing.*

5 cases were associated with *nasal polypi,*
4 „ „ „ *carious teeth,*
3 „ „ „ *anæmia,*
3 „ „ „ *deflected nasal septum,*
2 „ „ „ *infantile convulsions,*
1 case was „ „ *atrophic rhinitis,*
1 „ „ „ *hydrocephalus,*
1 „ „ „ *meningitis.*

There also occurred—

1 case of *malformation of auricle,*
1 „ *epithelioma of the tragus,*
1 „ *rodent ulcer of the auricle,*
1 „ *associated with broncho-pneumonia.*

Detailed Analysis of Cases in which Causes are given.

Adenoids.

Conditions found in 500 cases:

Retracted membrane (bilateral) in	255	cases.
Otitis media catarrhalis sicca in	77	„
Otitis media suppurativa chronica (bilateral) in	28	„
Congested membrane in	26	„
Otitis media catarrhalis exudativa in	21	„
Otitis media suppurativa chronica (unilateral)	19	„
„ „ „ „ with cicatrix in the membrane on opposite side	16	„
Otitis media suppurativa chronica with retracted membrane on the opposite side	13	„
Cicatrix in membrane (bilateral)	11	„
Cicatrix with otitis media catarrhalis sicca on the opposite side	10	„

Cicatrix (unilateral)	6 cases.
Cicatrix with retracted membrane on the opposite side	6 „
Otitis media suppurativa chronica, with a dry perforation of membrane on the opposite side . .	3 „
Retracted membrane (unilateral) . . .	3 „
Dry perforation (bilateral)	2 „
Otitis media suppurativa acuta (unilateral) . .	1 case.
„ „ „ „ (bilateral) . .	1 „
Dry perforation and otitis media catarrhalis sicca on the opposite side	1 „
Cicatrix of membrane with congested membrane on the opposite side	1 „

Ages at which the above cases came under observation: 1 to 5 years, 61 cases; 5 to 10, 200; 10 to 15, 135; 15 to 20, 80; 20 to 25, 10; 25 to 30, 8; 30 to 35, 4; 35 to 40, 1; 40 to 45, 1. Males composed 53·6 of the above cases of adenoids.

Tonsils.

Conditions found in the 44 cases:

Otitis media catarrhalis sicca . . .	occurred in	25 cases.
Retracted membranes . . .	„	9 „
Congested membranes . . .	„	2 „
Otitis media suppurativa chronica . .	„	2 „
Cicatrix membrane (bilateral) . .	„	2 „
Cicatrix membrane (unilateral) . .	„	2 „
Otitis media suppurativa chronica with caries of temporal bone	occurred in	1 case.
Otitis media suppurativa chronica with cicatrix on the opposite side	occurred in	1 „

Ages at which the cases came under observation: 1 to 5 years, 1 case; 5 to 10, 4; 10 to 15, 7; 15 to 20, 21; 20 to 25, 4; 25 to 30, 3; 30 to 35, 1; 35 to 40, 1; 40 to 45, 1; 45 to 50, 1. Males, 26; females, 18.

Plugs of Cerumen.

Number of plugs, 538 in 5,000 = 10·77 per cent.; males = 58 per cent. Plugs on one side only in 36·46 per cent. of cases. In 54·1 per cent. of the 538 cases plugs were the sole cause of the deafness.

Ages, taken from 200 consecutive cases: 1 to 10 years, 5 cases; 10 to 20, 25; 20 to 30, 41; 30 to 40, 42; 40 to 50, 33; 50 to 60, 19; 60 to 70, 25; 70 to 80, 9; over 80, 1.

Head Colds.

Conditions found in 100 consecutive cases:

Otitis media catarrhalis sicca (unilateral)	occurred in	1	case.
„ „ „ (bilateral)	„	36	cases.
Otitis media suppurativa chronica (unilateral)	„	7	„
„ „ „ (bilateral)	„	9	„
Cicatrix in membrane (unilateral) . .	„	3	„
„ „ (bilateral) . .	„	6	„
Oto-sclerosis (bilateral) . . .	„	9	„
„ (unilateral) . . .	„	1	case.
Otitis media catarrhalis exudativa (unilateral)	„	6	cases.
„ „ „ (bilateral)	„	2	„
Retracted membranes (bilateral) . .	„	4	„
Defective auditory perceptive apparatus .	„	4	„
Dry perforation	„	2	„
Otitis media suppurativa chronica with dry perforation on the opposite side . . .	occurred in	3	„
Cicatrix with dry catarrh on opposite side	„	2	„
„ with dry perforation on opposite side	„	4	„
Otitis media catarrhalis sicca with otitis media suppurativa chronica on opposite side	occurred in	1	case.

Table of Exanthemata.

No. of cases.		Deaf mute.	Ot. med. supp. chr. with cicatrix opp. side.	Cicatrix membrane, unilateral.	Cicatrix membrane, bilateral.	Defective auditory perceptive apparatus, unilateral.	Defective auditory perceptive apparatus, bilateral.	Ot. med. cat. sic., bilateral.	Ot. med. cat. sic., unilateral.	Sclerosis, bilateral.	Dry perforation, bilateral.	Dry perforation, unilateral.	Ot. med. supp. chr., bilateral.	Ot. med. supp. chr., unilateral.
139	Scarlet fever .	—	—	—	18	—	2	7	—	1	5	9	58*	38
51	Measles . .	—	1	5	6	—	2	6	—	—	—	2	14	14*
15	Typhoid . .	—	—	1	—	1	5	5	—	—	—	—	—	3
9	Diphtheria. .	—	—	—	—	—	1	1	—	—	—	2	2	3
6	Mumps . .	—	—	—	—	—	1	4	—	1	—	—	—	—
2	Whooping cough	—	—	—	—	—	2	—	—	—	—	—	—	—
1	Smallpox . .	—	—	—	—	—	—	1	—	—	—	—	—	—
1	Chickenpox .	—	—	—	—	—	—	—	—	—	—	—	—	1

* Thirteen of these cases had also caries of temporal bone, necessitating the radical mastoid operation.

† One case had a mastoid empyema.

Influenza.

Conditions found in 125 cases:

Otitis media suppurativa acuta (unilateral) occurred in	5	cases.
„ „ chronica (unilateral) „	16	„
„ „ „ (bilateral) „	5	„
„ catarrhalis sicca (unilateral) . „	9	„
„ „ „ (bilateral) . „	39	„
Defective auditory perceptive apparatus . „	29	„
Otitis media suppurativa chronica with cicatrix on the opposite side . . . „	2	„
Dry perforation in membrane (unilateral) . „	5	„
„ „ (bilateral) . „	3	„
Caries of temporal bone (unilateral) . . „	2	„
Oto-sclerosis (bilateral) . . . „	5	„
Otitis media catarrhalis exudativa (unilateral) „	3	„
„ „ „ (bilateral) . „	1	case.
Tinnitus (without any evident lesion) . „	1	„

Furunculosis.

In 5000 cases this disease occurred in 75 cases:

52 unilateral.
23 bilateral.

In 1 case the cause was diabetes.

Average age of occurrence .	31
Youngest . . .	14
Oldest	57

Direct Exposure to Cold.

This occurred in 51 cases. Conditions found were:

Otitis media suppurativa chronica (unilateral) . .	15	cases.
„ „ „ (bilateral) . .	4	„
„ catarrhalis exudativa (unilateral) . .	7	„
„ „ „ (bilateral) . .	6	„
„ „ sicca (unilateral) . .	1	case.
„ „ „ (bilateral) . . .	9	cases.
„ suppurativa acuta (unilateral) . .	7	„
Otitis externa diffusa	1	case.
Otitis media catarrhalis sicca and cicatrix in membrane .	1	„

Trauma.

This cause was present in 45 cases:

Otitis media suppurativa chronica (unilateral) . .	12	cases.

Otitis media suppurativa chronica with labyrinthine suppuration	1 case.
Defective auditory perceptive apparatus (unilateral)	7 cases.
„ „ „ „ (bilateral)	5 „
Auditory concussion (unilateral)	8 „
Rupture of membrana tympani (unilateral)	4 „
Cicatrix in membrane	2 „
Tinnitus (with no apparent lesion)	2 „
Deaf mute	1 case.
Dry perforation	1 „
Fracture skull, with defective auditory perceptive apparatus	1 „
Vertigo with tinnitus (no apparent lesion)	1 „

Syphilis.

25 cases.

Defective auditory perceptive apparatus (bilateral)	19 cases.
Otitis media catarrhalis sicca (bilateral)	6 „

In 21 of above cases the syphilis was congenital.

Bathing.

22 cases.

Otitis media suppurativa chronica (unilateral)	7 cases.
„ „ „ (bilateral)	3 „
Otitis media catarrhalis sicca (unilateral)	1 case.
„ „ „ (bilateral)	8 cases.
„ „ exudativa (unilateral)	2 „
Otitis externa diffusa (bilateral)	1 case.

Mental worry or shock.

20 cases.

Defective auditory perceptive apparatus (bilateral)	12 cases.
Tinnitus (with no apparent lesion or deafness)	6 „
Otitis media catarrhalis sicca (bilateral)	1 case.
Oto-sclerosis	1 „

In 11 cases the patient was a male.
„ 9 „ „ „ female.

Gout.

15 cases.

Otitis media catarrhalis sicca (bilateral)	was present in	5 cases.
Defective auditory perceptive apparatus (bilat.)	„	4 „
Eczema of meatus	„	4 „

Tinnitus and vertigo (with no apparent lesion and no deafness)	was present in	1 case.
Exostosis of meatus . . .	,,	1 ,,

Confinements and Child-bearing.

14 cases.

Otitis media catarrhalis sicca (bilateral)	was present in	9 cases.
Oto-sclerosis (bilateral) . . .	,,	5 ,,

Carious Teeth.

4 cases.

Otitis media suppurativa chronica (unilat.)	was present in	2 cases.
Otitis media catarrhalis sicca . .	,,	1 case.
Cicatrix membrane . .	,,	1 ,,

Nasal Polypi.

5 cases.

Otitis media catarrhalis sicca (bilateral)	was present in	3 cases.
Otitis media suppurativa chronica (unilateral)	,,	2 ,,

Deviated Nasal Septum.

3 cases.

Otitis media catarrhalis sicca (unilateral) . .	2 cases.
Tinnitus (no deafness and no apparent lesion in ear) .	1 case.

Atrophic Rhinitis.

Otitis media catarrhalis sicca	1 case.

Anæmia.

3 cases.

Tinnitus (no deafness)	2 cases.
Oto-sclerosis	1 case.

All females.

The single cases of meningitis and hydrocephalus, and the 2 of infantile convulsions in all cases gave rise to bilateral defective auditory perceptive apparatus.

The "nasal douche" caused one case of unilateral otitis media suppurativa acuta.

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